AMERICAN
DYESTUFF REPORTER
DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY
BLEACHING • DYEING • FINISHING •

BUREAU OF
RECEIVED
DEC 29 1931
LIBRARY
RECEIVED
DEC 28 1931
U. S. Department of Agriculture

VOLUME XX DECEMBER 21, 1931 NUMBER 25

THE NEWPORT COLORS

fast dyes

ACID ANTHRAQUINONE COLORS

Newport Acid Anthraquinone Colors are distinguished by excellent fastness properties on woolens, worsteds .... in women's and men's wear, carpets, and wherever superior fastness is desired.

NEWPORT
TRADE MARK
"COAL TO DYESTUFF"

E. I. Du Pont De Nemours & Co., Inc.

Successor to

Newport Chemical Works, Inc.

Passaic, New Jersey

BRANCH OFFICES AND WAREHOUSES

Boston, Mass.
80 Broad Street
Providence, R. I.
32 Custom House Street
Canada
Castle Building, Montreal, P. Q.

Chicago, Ill.
605 West Washington Boulevard
Greensboro, N. C.
226½ North Forbis Street

Philadelphia, Pa.
437 East Allegheny Avenue
Greenville, S. C.
Chamber of Commerce Building
Newnan, Ga.
186 Jackson Street

OFFICIAL PUBLICATION OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

BECCO Inaugurates New Method of Shipment . . .

. . . bringing new economy to the BECCO process

Becco Popularity Demands Tank Car Transportation

BLEACHERS of a generation ago would have said this impossible. Even four years ago when BECCO was introduced to the arts in the United States and Canada, tank car shipments seemed beyond the realm of possibility. Yet so rapid has been the spread of BECCO popularity that today the transportation of hydrogen peroxide has been revolutionized!

To meet a growing demand, the 8,000 gallon tank car shown above (carrying the equivalent of 80,000 pounds of shipper's peroxide) is now making regular deliveries of BECCO to mills of leading importance. And additional similar tank cars are at present under construction.

An idea of the economy of this new method of transportation is gained by the fact that it would take three carloads of ordinary carboys to carry an equivalent volume of peroxide.

Has your plant discovered the reasons for BECCO'S popularity, the reasons that made tank car shipments imperative?

Write for full particulars to the Buffalo Electro-Chemical Co., Buffalo, N. Y. Branches in Boston, New York, Philadelphia, Chicago, Charlotte, Toronto, Montreal.

BECCO
Electrolytic
HYDROGEN PEROXIDE

American Dyestuff Reporter, Vol. XX, No. 25, December 21, 1931. Published Bi-Weekly by Howes Publishing Co., Inc., 440 Fourth Ave., New York, N. Y. Domestic subscription, $5.00; Canadian, $5.50; foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y. Post Office, under the Act of March 3, 1879. Copyrighted 1931, by Howes Publishing Co.

Contents of This Issue

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

December 21, 1931

A Consideration of the Mechanism of Dyeing 809
By A. J. Hall

Finishing Artificial Silk Fabrics..... 812
By H. Chadwick

Effective Value of Hydrosulphite Preparations and Control of Dye Vats..... 813
By Dr. Richard Fiebelmann

Theoretical and Applied Silk Soaking—II.. 815
By Ralph Hart

The Treatment of Waste Liquors from Dyeworks 836
By S. R. Trotman

Chemical Research Unimpaired by Reduced Federal Appropriations 840

Proceedings of the American Association of Textile Chemists and Colorists

The Annual Meeting.....(353) 817

November Meeting, South Central Section .....(355) 827

Bleaching Troubles on Cotton and Wool Hosiery .....(356) 828
A Paper by L. E. Milliken

Editorials:

Welcoming 1932 829

Hints to Authors..... 829

Index to Volume XX..... 819

GIVAUDAN AROMATIC

Are You—

HAVING TROUBLE WITH ODORS IN YOUR FINISHES?

TEX-O-DORS are specially developed aromatic oils of proven value in overcoming unpleasant odors in all types of finished goods.

Send for samples and descriptive literature—and see for yourself where Tex-O-Dors can fit in your finishes.

Givaudan-Delawanna, Inc.
80 FIFTH AVENUE, NEW YORK, N.Y

PRODUCTS DELAWANNA

DU PONT
REG. U. S. PAT. OFF.

TECHNICAL SERVICE

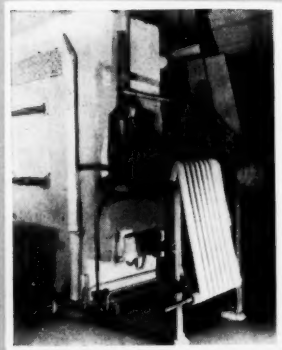


Illustration shows Rapid Ager used in du Pont's Technical Laboratory to approximate actual printing mill conditions.

This accurate control testing insures the high uniform quality of du Pont Dyestuffs.

A NEW ORANGE *that gives Better White Discharges*

PONTAMINE DIAZO ORANGE WD

Particularly suitable for dyed grounds on rayon and cotton piece goods, to be discharged white.

This color is also suitable for use on cotton rawstock and yarns.

Write for further particulars regarding this product.

DU PONT DYESTUFFS
REG. U. S. PAT. OFF.

Du Pont Dyestuffs

E. I. DU PONT DE NEMOURS & COMPANY, INCORPORATED

Dyestuffs Department, Wilmington, Delaware

SALES OFFICES: Boston, Mass., Charlotte, N. C., Chicago, Ill., New York, N. Y., Philadelphia, Pa., Providence, R. I., and San Francisco, Calif. Represented in Canada by Canadian Industries Limited, Dyestuffs Division, Canada Cement Building, Montreal, Canada

AMERICAN DYESTUFF REPORTER

"Circulated Everywhere Dyestuffs Are Used"

Published by Howes Publishing Company, 440 Fourth Avenue, New York

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

VOLUME XX | DECEMBER 21, 1931 | NUMBER 25

A Consideration of the Mechanism of Dyeing

By A. J. HALL, B.Sc., F.I.C., F.T.I.

The manner in which dyes, particularly direct dyes, are absorbed and retained by cotton and viscose rayon fibres is very imperfectly understood, and a perusal of the literature relating to theories of dyeing reveals evidence of much confusion of thought on this subject. Much information is available about the properties of fibres and of dyes, yet it would appear that insufficient is known to enable textile colorists to form a clear view of the manner in which a fibre may be colored (with a reasonable degree of permanence) by means of a direct dye.

TODAY, a large proportion of dyers trouble themselves but little about the mechanism of dyeing; that is, the combination of physical and chemical forces and processes by which a dyestuff becomes attached to a textile fibre. They take the view that no one knows much about it and that it repays more to get on with the dyeing job itself. In spite of this the writer believes that better and more efficient dyeing would be obtained if dyers understood the mechanism of dyeing more thoroughly.

This article deals with a view of dyeing which may not necessarily be correct; it is based partly on fact and partly on speculation. But it is hoped that this view will stimulate interest in the subject and perhaps in this way lead to a better understanding of dyeing phenomena.

Dyeing viscose rayon with direct dyes is always carried out by immersing the rayon in an aqueous solution of the dye. In general, the absorption of the dye by the rayon is assisted by employing hot dye liquors and also by the addition of an inorganic salt, such as sodium chloride, to the dye liquor. It is thus of first importance to form a view of the condition of the dye liquor and of the rayon fibre.

When the dye liquor is prepared by dissolving in water a solid direct dye it is assumed that the dye becomes very much sub-divided so that the dye solution consists of small dye particles moving about amid water molecules. Whether or not each dye particle attracts to itself (somewhat loosely) a number of water molecules is not known, but in the first place it will be regarded that the dye particles are quite free. It is unlikely that all the dye particles are of equal size; it is more probable that their size is within certain limits but that the majority are of a size which depends on the temperature of the solution, its concentration, and the presence of salts. Whether or not these dye particles are electrically charged is not considered here.

The modern view of the structure of a viscose rayon fibre is accepted, and thus each fibre is viewed as consisting of bundles of chains of cellulose molecules the bundles being mostly parallel to the fiber axis. Thus each fiber is very porous in character; it is not considered solid in any way.

In Fig. 1 is depicted a rayon fibre consisting of bundles of chains of cellulose molecules (each bundle is known as a micelle) largely aligned in the direction of the fibre axis. These micellae must be held together by forces otherwise the fibre would disintegrate, and it is reasonable to assume that at least two types of force exist. The first type is the *end-to-end* force by which the bundles are held in line; this force largely determines the tensile strength of the fibre. The second type of force is the *lateral* force such as exists between each micelle and the micellae immediately surrounding it. Because most viscose rayon fibres have a maximum strength in the direction of their fibre axis it is evident that the end-to-end forces are much more powerful than the lateral forces. This fact is of considerable importance in dyeing phenomena.

When such a viscose fibre is placed in water alone it

Fig. 1
a = bundle of chains of cellulose molecules (a micelle).

swells both in length and diameter, but as it is well known, the length extension is but 5% whereas the increase in diameter may amount to 30 to 40% according to the manner in which the viscose has been manufactured. Extension either in diameter or length must be due to entrance into the fibre of water molecules, and because of the greater lateral swelling it is evident that the water molecules do not appreciably alter the end-to-end spacing of the micellae but rather the lateral spacing. So that a viscose fibre when plunged into water changes its form as shown in Fig. 2.

It is now possible to consider the processes which occur when a viscose rayon fibre is immersed in a dye solution. Immediately following immersion the fibre absorbs water. The entrance of water between the lateral spaces of the fibre should be accompanied by an entrance of dye particles, but this latter process is subject to other considerations. Firstly, the size of the dye particles must be sufficiently small that they can pass into the lateral spaces. Obviously if these spaces are smaller than the dye particles then no penetration of the fibre by the dye can take place. Secondly, the degree of penetration of dye particles into the fibre will depend on the proportion of exceptionally small particles.

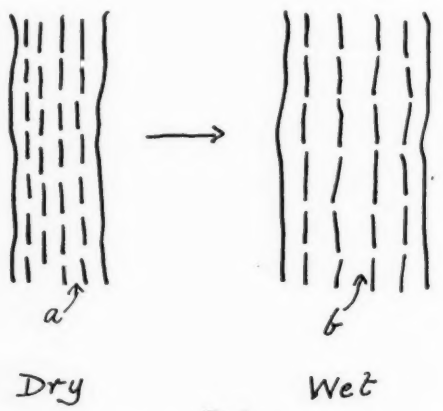


Fig. 2
a = Small lateral spaces. b = Large lateral spaces.

Considering now the case of a dye particle passing into the fibre. If the particle is very, very small and the lateral spaces very large then it is possible for the particle to travel a considerable distance into the fibre before it actually comes close to a micelle. Eventually however the particle will come in close contact with a micelle and be attracted to it so that dye particle and micelle become attached. At this stage the dye particle may be considered as having dyed the fibre or rather the particular micelle to which it has become attached.

As the size of the dye particle is increased so does the particle have less chance of penetrating far into the fibre before becoming attached to a micelle. Also as the lateral spaces between the micellae are decreased so again does the dye particle find penetration difficult. Under these circumstances it is evident that in the dyeing process the larger dye particles will penetrate but little into the viscose fibre, whilst those much smaller will penetrate considerably.

As the dyeing process continues the concentration of dye in the water within the fibre becomes less than the concentration outside the fibre. Then this difference must be eliminated by entry of more dye particles into the fibre. In this manner there is a continuous entry of dye particles into the fibre and most of these will eventually become attached to micellae. The tendency will be for the average size of dye particle in the dye liquor to become greater since there is less chance for the large particles to enter the fibre.

There must come a time when attachment of dye particles to the micellae will cease for one or both of two reasons, namely, that the remaining dye particles in the dye liquor are too large to enter the fibre or that the micellae are saturated with dye (their attractive forces towards the dye particles are then completely satisfied). Further dyeing can then take place only by reducing the dye particle size or by increasing the lateral spaces between the micellae, and for this it is possible to increase the temperature of the dye liquor or add dispersing agents. At this stage the viscose rayon fibre is assumed to have the form shown in Fig. 3, it being noticed that no dye particles are positioned in the end-to-end spaces.

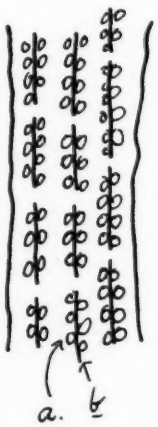


Fig. 3
a = Dye particles. b = Micelle.

It is possible to carry out experiments supporting the above view of dyeing phenomena. If a fibre as depicted in Fig. 1 is stretched in the direction of its lengths then this will have the effect of diminishing the size of the lateral spaces. In turn this should restrict the entry of dye particles. Thus a fibre stretched during dyeing should dye to a paler shade than one not so stretched. Various investigations along these lines have been published by the writer (J. Soc. Dyers and Col. 1929, 45, 98 and 171) and it is a general rule that stretching leads to paler dyeing although the resulting differences in shade between the unstretched and the stretched fibres is partly dependent on the nature of the dye. In this connection it is pointed out that the stretching was applied in these investigations both to individual fibres and to yarns.

So far, consideration has been given to the dyeing of a viscose rayon fibre as shown in Fig. 1 in which the micellae are mainly aligned parallel to the fibre axis. Not

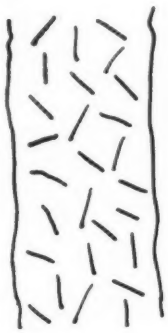


Fig. 4

all fibres have such a structure; it is possible for a fibre to have its micellae arranged at random as shown in Fig. 4. The stretching of this fiber lengthwise should result in an increase of dyeing absorption. Similarly, if it were possible to stretch a viscose fibre of the type shown in Fig. 1 laterally this also should increase its absorption of dyes. It is difficult to test these ideas working with viscose fibers, but it is possible to obtain confirmatory evidence by use of viscose film (Cellophane).

Cellophane is manufactured by extrusion of a viscose solution through a slit instead of a jet as in rayon production. As a direct result of this the micellae will tend to become aligned in the direction of extrusion rather than at right angles to this direction. In Fig. 5 is shown a piece of cellophane illustrating the probable alignment of micellae with regard to the axes AB (direction of extrusion) and CD; the majority of micellae are parallel to axis AB.

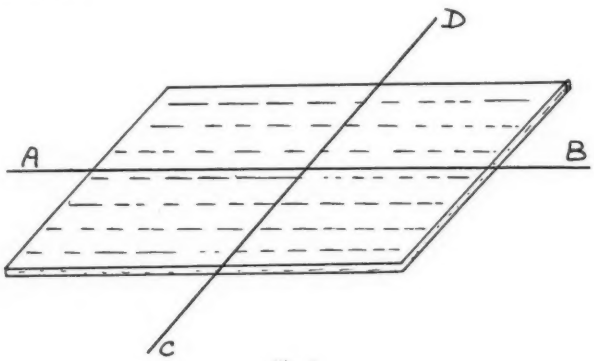


Fig. 5

Strips of the cellophane may now be cut parallel to both of these axes and then dyed whilst under a stretching force; if the above considerations hold good then it will be anticipated that the stretching will produce increased dyeing in the strip cut parallel to CD and decreased dyeing in the strip cut parallel to AB. The following results were obtained by the writer in experiments along these lines:

The strips of cellophane were each about ½ inch wide and 12 inches in length, were suspended from a glass rod (Fig. 6) and weighted with 68 grams. A piece of cellophane quite slack was also suspended from the same rod and the whole lowered into a beaker of dye liquor for about five minutes; the dye liquor was at room temperature and contained about 1/20th% of a direct dye. Subsequently the strips were rinsed with cold water and dried and then compared as regards their depth of shade. In the following table the depth of shade is indicated by a number; the higher the number the greater is the depth of shade.

DEPTH OF SHADE ON STRIP

Dye	Slack	Stretch parallel to AB	Stretch parallel to CD
Chlorazol Fast Red K	1	¾	2
Chrysophenine G	1	¾	1
Chlorazol Fast Helio BK	1	½	2
Chlorazol Fast Sky Blue FF	1	¾	3

It is evident that the above results support the theory of dyeing as outlined above.

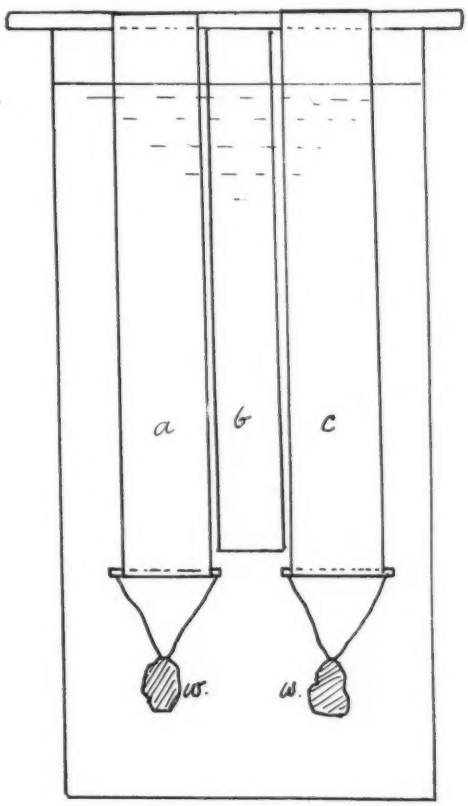


Fig. 6

a, b, and c = Strips of Cellophane. w = Weights.

Lateral stretching of a viscose rayon fibre facilitates dyeing. Although this cannot be done mechanically yet it can be accomplished by immersion of the fibre in water—the water acts as a stretching force. Thus the great importance of water in a dye solution, not only for the purpose of dissolving the dye, but also for its stretching (swelling) action on the viscose fibre. Thus alcohol has no appreciable swelling action on viscose rayon and this fibre does not become colored when immersed in an alcoholic solution of a direct dye. It may be that without the swelling the lateral spaces in a viscose fibre are too small to admit the entry of a dye particle.

It would be anticipated that any treatment of viscose rayon which produced permanent swelling would give this fibre an increased affinity for direct dyes, and this is

actually the case. For instance, if viscose rayon be immersed in a 5% solution of caustic soda and then washed free from alkali, the rayon has a markedly increased affinity for such colours as Chlorazol Fast Yellow 5GK and Chlorazol Fast Green PL Conc. During the treatment with alkali the swelling of the rayon can be observed easily.

On the other hand if the alkali-treated viscose rayon be dried at a high temperature for say two hours before dyeing then it will be found that the increase of dye absorption will be much less than if the rayon is not dried; this effect is obviously due to the fact that heating causes the rayon to contract so that the lateral spaces between the micellae become comparatively small.

So that summing up the above discussion it is seen that dyeing is largely concerned with the penetration of a porous cellulose structure by small dye particles, the degree and extent of this penetration being dependent on the relative size of the dye particles and the spaces within the fibre. Nothing has been said about the forces which hold the dye particles to the micellae because practically nothing is known about these forces.

Finishing Artificial Silk Fabrics*

By **H. CHADWICK**

THE finish given to an artificial silk cloth largely determines its fabric qualities and commercial value. Cloth designers aim at some standard of ideal for the final result of their creations. No matter how skillfully a fabric may be constructed, or how carefully it may be manufactured, unless it is finished successfully all these preliminary efforts are unavailing.

Every piece of dyed material submitted to finishing treatment has potential fabric characteristics. It is the task of a finisher to develop these to their fullest extent by all the devices known to his art. Some fabric qualities, for example, crepe effect or lustre, are present in dyed goods passed forward for treatment. In every case care must be taken that finishing operations in no way diminish these properties but help to reveal the virtues of each to a desired extent.

Often a finisher's function is remedial. Masking imperfections, subduing one characteristic which is too prominent, bringing another from obscurity into prominence—all these jobs form part of general routine. Whatever the nature and condition of goods received, when passed out from a finishing room, they must be of even quality, bearing comparison with approved standards.

The art of finishing artificial silk cloths has slowly developed a technique of its own. At first the practice of the natural silk and the cotton industries was followed, but in time the methods and machinery of these were found insufficient to produce satisfactory results on cloths of the newer fibre. Methods have been modified, machinery adapted, or entirely new machines devised to secure satisfactory finishes.

One of the greatest difficulties a finisher of artificial silk cloths has to contend with is that of obtaining reliable and well founded criticism of the results he is producing. The value of any expressed criticism, adverse or favorable, lies in the meaning conveyed to the hearer, and in his capability of resolving that meaning with beneficial results. The underlying basis of any opinion on the worth of a fabric is what the consumer thinks about it, or what attributes lead to its purchase in preference to competitives.

The organization of any finishing plant should provide for the transmission of opinions of consumers to those in charge, particularly as regards finished fabric properties. Too often is this aspect of finishing neglected. Salesmen, in close touch with a market, should be careful to pass on the results of observations concerning the trend of fashions. Very often a decline in the popularity of a cloth, hitherto successful, concerns some small detail of finish attained by a competitor, which is not beyond the capacity or skill of any finishing department.

Examples are extremely numerous. Lustre, harshness, and figure, vary from time to time according to the dictates of fickle fashion. A lustrous cloth may be converted to half matt, a harsh handling cloth softened, or a figure may be intensified in a finishing department without much difficulty. In this way markets may be captured, but only if the way markets are moving is known to a finisher.

Confusion of Meanings

In the transmission of information to a finishing section there is much difficulty of expression, and of conveying an exactitude of meaning. In summarizing and analyzing opinions on fabrics, one is struck by the looseness of meaning of terms employed, and the varying significance of the terms in the minds of those using them. Largely because of this confusion reliable judgments are difficult to obtain.

A case coming before the notice of the writer illustrates this point. A particular cloth had a successful run, but occasionally a wish was expressed by buyers for a softer handling material of the same weight and construction. Several alternative finishes were prepared all of which were considered softer than the original, one in particular being far superior. When asked to indicate a preferred sample rarely did the choice of different buyers agree. In one case the original was selected.

There was no doubt that two fabric properties, softness and smoothness, were being confused. A similar confusion exists in the estimation ofother fabric characteristics. Even visible qualities, such as degree of lustre, are difficult of clear definition and conception. The terms matt, half-matt, and full lustre convey different meanings to different finishers.

It follows that descriptive capacity of speech must be supplemented by illustrative samples. The establishment of standards of fabric characteristics is a very important factor in the efficiency of a finishing plant. This is in addition to normal standards of finish for fabric undergoing treatment. From such standards judgments on pro-

(Continued on Page 814)

*Dyer and Calico Printer

Effective Value of Hydrosulphite Preparations and Control of Dye Vats

By **DR. RICHARD FEIBELMANN**

Hydrosulphite is of great variability and in all its applications it is of the utmost importance to know its reducing value. The methods described herewith illustrate means for controlling Hydrosulphite compounds and dye vats.

IN spite of the general use of Sodiumhydrosulphite it may be frequently observed that the properties of this compound are not known at all. The fact that Hydrosulphite is of great variability is hardly ever considered, and yet, in all its applications, it is of the utmost importance to know its reducing value.

No doubt, there is a pronounced difference when, for instance, using 1 lb. of full value 100% Sodiumhydrosulphite or 1 lb. of an older preparation that corresponds to only 70% of its original effectiveness.

The reason for not considering these conditions is mainly because of the lack of a method of sufficient simplicity to easily and quickly determine the reducing value of Hydrosulphite combinations, even without analytical schooling.

I, therefore, believe that the following methods for controlling Hydrosulphite combinations and dye vats will be of interest to the readers of this journal.

The apparatus was invented by the Chemische Fabrik Pyrgos, G.M.B.H. in Radebeul-Dresden and is distributed in the U.S.A. by the Heyden Chemical Corporation, 50 Union Square, New York, N. Y.

I. The Hydrosulfometer

The apparatus, as shown in the sketch, consists of a glass cylinder, closed by a glass stopper, and graduated from 0% to 115% in graduations of 5%. 100%, for instance, would indicate an undecomposed full value Sodium-hydrosulphite, of the formula $Na_2S_2O_4$.

Why then has the scale been continued about 100%? Is there a sodium-hydrosulphite that is of a higher value than a 100% preparation? Indeed, there is. Sodium-hydrosulphite is an anhydride, formed by Sodium-Bisulphite and Sodium-Sulfoxylate:

$$Na\,H\,S\,O_3 + Na\,H\,S\,O_2 = Na_2\,S_2\,O_4 + H_2O$$

Now, in judging the value, the Sulphite part is left out of consideration, as its reducing power, compared to the Sulfoxylate part, is negligible. The Sulphite constituent in Sodium Hydrosulphite therefore is solely ballast and the value of the preparation depends only on the Sulfoxylate content.

There are Hydrosulphite combinations which contain Formaldehyde instead of Sulphite (Rongalite and similar.) The molecular weight of the Formaldehyde is less than that of Sulphite and therefore a full value Rongalite preparation indicates a higher content of Sulphoxylate, theoretically a maximum of 113%, as compared to Sodium-hydrosulphite. This is the reason for continuing the scale up to 115%. It thereby may serve for the determination of the reducing value of Rongalite as well as of Hydrosulphite. The value of the preparation is thereby expressed in terms of Sodium hydrosulphite.

Directions for Use

In order to determine the value of Sodium-hydrosulphite, 1 gram of the preparation is filled into the cylinder and ½ cc. Formaldehyde is put into it. Then water is added up to the 0 mark. Stir with a glass rod to dissolve the powder. Now add in small portions the measuring solution—Ferrirhodamid—(which is furnished with the apparatus), up to that point where discoloration no longer takes place and the dark red coloration persists. On this point, the value of the preparation may be read off directly from the cylinder.

If determining Rongalite, the method is the same, although Formaldehyde is not to be added.

In testing a solution of an effective preparation, no weighing is needed. In this case, fill in the solution up to the first graduation mark and continue as above. The obtained result is to be divided by ten. For instance, should the figure 25 be ascertained, the solution contains 2.5% Sodium-hydrosulphite.

2. The Vatometer

This serves for the control of dye vats, as regards their reducing value. The reducing value of a vat is solely dependent on the content of effective Sodium-hydrosulphite. When the dyestuff is reducted to a leuco-dyestuff, whereby Hydrosulphite is being consumed, theoretically no change in the reducing power of the vat takes place, due to the fact that the reducing power of the Hydrosulphite has passed over to the dyestuff which in the form of its leuco-compound is just as easily oxidized as the corresponding part of the consumed Hydrosulphite. Under "Reducing power of a vat", one thereby understands the combined value of the reduced dyestuff and the surplus Hydrosulphite.

Up to now, this reducing value has been estimated by observing the degree of speed and thoroughness with

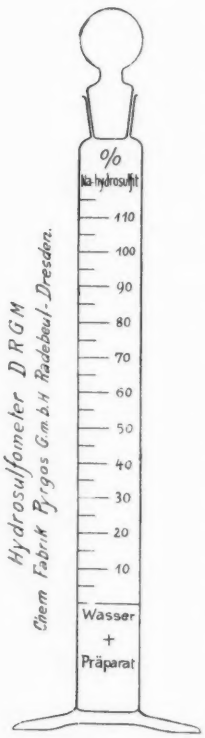


Fig. 1
Hydrosulfometer.

which Indanthren yellow paper colors to blue, when brought into contact with the vat. Another method is to observe the oxidation of the vat on a glass plate. These, of course, are rather crude and unreliable methods which do not indicate the real content of Hydrosulphite.

Now this figure may be determined with sufficient exactness in two minutes with the aid of the Vatometer. The reducing value is expressed in grammes of Hydrosulphite per liter of the vat and may be read from the scale. While the Hydrosulphometer is based on the titrimetry, the Vatometer performs a gas analysis by which all former difficulties, as regards the vat in analytical respect, are removed.

Description of the Apparatus

The Vatometer consists of two parts, the flask, the neck of which is covered with a layer of cork to protect it from the heat of the hand, and the inset, consisting of a glass tube with a tap. The upper part of the tube is enlarged and has a scale from 0 to 10. These figures express the reducing value. Below the tap, the tube is fused with an ampule which is provided with a small hole for balance of pressure. The whole apparatus is about 12 inches in height.

Directions for Use

First a few drops of a lathering product, which is being furnished with the apparatus, are put into the flask, then 10 c.c. are taken with the Vatometer Pipette from the dye vat, to be analyzed. The pipette is to be closed on one end with a rubber stopper, if the vat is hot; it should then be cooled down to room temperature, under running water. After the vat has flown into the flask, close it with the inset—(wet the ground part in order to shut it tightly)—then fill the scale tube, with open tap, with water up to 0. Now close the tap, pour the water off the upper part and shake the flask vigorously in the longitudinal axis by holding your index finger on the tap to prevent the upper part from falling out. In the foam that is forming the vat oxidizes very fast (one minute). Thereby a quantity of oxygen is bound that is equivalent to the reducing power, and a vacuum forms in the flask. The termination of the oxidation may be noted from the color change, as the vat usually is of another color than the dyestuff. Usually, a shaking of one minute is sufficient. If the scale tube now is filled again with water up to the 0 mark and the tap is opened, the water flows into the flask, then comes to a stop, and this point of the scale indicates the reducing power of the vat. The values, lying between two figures, can easily be estimated. This method gives simply and quickly a sufficiently accurate value, indicating the grammes of Sodiumhydrosulphite per liter.

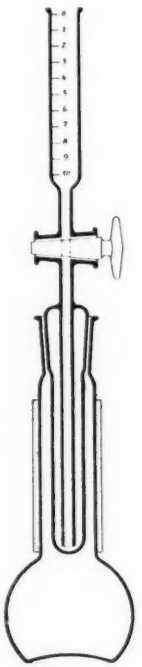


Fig. 2
Vatometer.

Consideration of temperature and air pressure, which would be necessary for an exact gas analysis, is not required here, as the slight deviation, which may be obtained, does not influence the results to any extent.

Remarks

For instance, should a reducing value of 3 be found, while the vat was started with 5 grammes Hydrosulphite per liter, 2 grammes and the corresponding quantity of dyestuff should be added to bring the vat back to starting effectiveness. Should the vat contain glucose, one will find the reducing powder to be slightly higher than would correspond to the content of Hydrosulphite, as glucose also consumes oxygen, although much slower than Hydrosulphite. This fact, however, is negligible, if one gets accustomed to observing a time of exactly one minute for shaking, and if the results are considered more as comparative values than as absolute figures.

A patent for the apparatus has been applied for.

FINISHING ARTIFICIAL SILK FABRICS

(Continued from Page 812)

duction or on new patterns may be expressed with some degree of exactitude. Standards should not be confined to cloths produced at home. Competitive cloths should be included, as these are met with which are temporarily superior to one's own products.

Standards need constant revision, and unceasing experiment should be made to improve methods to secure highest possible standards. A handle pleasing a market to-day may be superseded tomorrow by the appearance of new cloths from competitive houses. An efficient finishing plant should endeavor to be in front of its rivals.

In a succeeding article it is proposed to consider finishing artificial silk cloths from the aspect of some principal fabric characteristics. Methods of treatment to secure best results will be discussed. Some of the qualities of a successful cloth must of necessity be created during early stages of manufacture. A knowledge of these processes is of untold value in developing a desired effect to its fullest extent by appropriate finishing treatments.

The collaboration between a finishing department and other production units is essential to successful cloth manufacture. A finished fabric is the result of combined effort and a defect in any one particular destroys the value of the whole.

Theoretical and Applied Silk Soaking—II

By **RALPH HART**
Hart Products Co.

Part II of this series concludes the article on "Theoretical and Applied Silk Soaking." The first part appeared in the last issue of the REPORTER. The author calls attention to the fact that trade journals and technical publications have been freely consulted.

NEVILLE and Marshall recommend triethanolamine in combination with sulphonated oil and other oils for silk soaking. They find that the emulsion thus formed has a very high degree of dispersion and unusual stability, and should show excellent penetrating qualities. One of the emulsions which they used had the following composition: sulphonated neatsfoot oil, 7.5 cc. triethanolamine, 1 cc. raw neatsfoot oil, 7.5 cc., water to make 1000 cc. A test soaking with this emulsion at 37.8° C. (100 F.) gave a take-up of 6.38%, and the results indicated that it can be used successfully to soak silk in five hours. The take-up was higher than similar soakings but without the triethanolamine. This is contrary to the experience of Searell and Hart, who find that the more stable the emulsion the smaller the take-up, provided of course sufficient time is allowed for complete penetration, which is generally the case in overnight soaking. For example, sulphonated oils which give comparatively stable emulsions are known to yield lower take-ups than the less stable mixtures of soap and oil. In test soakings on a semi-commercial scale, they found practically no drop in concentration of fatty matter in the liquor after soaking in an emulsion of a soluble oil just neutralized with triethanolamine or with excess, whereas the drop in concentration when soaked in a bath containing the original, acid, and less table oil was considerable, indicating a much greater take-up. Ditton claims to have obtained adequate softening of the silk for winding purposes upon adding triethanolamine to the soaking liquor, but the yarn lacked sufficient moisture pick-up on the knitting machines.

MILDEW

T. F. Heyes and H. S. Holden, English investigators, have made a scientific study of the effects upon raw and degummed silk of bacteria and molds. They find that mildew may develop fairly readily upon raw silk, more so if partly degummed, but that it causes no tendering; it may destroy the gum, however, and cause discoloration due to colored spores. They find that bacteria, which are one-cell organisms and represent a lower form of life than molds, do exert a slight tendering effect but do not affect the dyeing properties of the silk. Their results on mildew are confirmed by another writer who states that the positive effect of mildew on silk crepe is the softening and removal of the sericin. There is, in addition, a formation of various coloring matters which stain the silk and resist a severe boiling-off in soap. Mildew also causes irregularities in the adsorption of tin and dyestuffs and leads to streaky dyeing. A practical dyer supplies the following information: Mildewed goods cannot be dyed evenly, no matter how skillful the dyer may be. If mildew is fresh, it is possible to correct it by stripping and redyeing. In most cases, however, the damage is permanent and the goods must be sold as seconds.

R. Burgess finds that soap, oil, and other finishing and conditioning materials further the development of mildew on wool. Because of the chemical similarity between the two fibers, his results may well be applied to the possible effect of soaking oils on the growth of mildew upon silk. Vegetable oils, he further finds, also further the growth of mildew but to a less extent than soap. Mineral oils, however, do not stimulate mildew development, but on the contrary, tend to check it. There was also no obvious relation between the free fatty acid content and mildew. The alkali of the soap, Burgess believes, combines with the wool, weakening and converting it into a form which is more readily attacked by molds. On the other hand, vegetable oils are in themselves a nutrient for bacteria, causing the disappearance of the oil during the process. Alkaline conditions were found to be much more favorable for the attack by molds and bacteria than acidic, although the possibility of mold growth under the latter conditions must not be ignored. It is likewise well known that bacteria favor real wet conditions, whereas molds prefer dampness. In processing silk, mildew is more likely to develop in the knitting mill where the yarn, particularly if highly twisted, is preferred moist, than at the throwing plant. Conditions favoring mildew growth are high humidity, darkness, temperature at about 70°F., lack of air circulation, and long storage, either in the humidors or between dyeing and boarding. Backwound cones are also very prone to mildew. Air-tight containers for cones, by causing local condensation of moisture, may be another cause. Among the chemicals recommended for preventing mildew and bacterial decomposition, to be added to the soaking bath or in backwinding, or both, are sodium benzoate (0.1 to 0.2% concentration), salicylic acid, cresols, and particularly sodium fluosilicate, about 0.5% on the dry weight of the silk. Certain tints and acid sul-

phonated oils have also been found to exert an antiseptic effect.

Oxidation, Gumming and Rancidity

Animal and vegetable oils are subject not only to mildew and bacterial decomposition, but also to gumming and rancidity, made evident by a tallowy odor. These changes are due to oxidation, or to the absorption of oxygen by the oil. Oxidation depends upon the quality and kind of oil, and is accompanied by an increase in free fatty acids and a drop in the iodine number of the oil. It is promoted by heat, light, unsaturated fatty acids, and metallic catalysts, especially iron. Upon oxidizing oleic acid or its glycerides, such as olive oil, neatsfoot oil, etc., there are produced certain odoriferous aldehydes, to which the rancid or tallowy odor is probably due. With certain chemicals these compounds give color reactions whose intensity varies with the amount of oxidation, which form the basis of the Kreis test for rancidity. Moisture inhibits somewhat the development of rancidity, supposedly because of the fact that the oxidation, in the presence of water, is carried beyond the aldehyde stage—i.e., fatty acids are formed, and they do not possess this tallowy odor. It seems that oils of the linoleic and ricinoleic type, such as linseed, cottonseed, and castor oil, do not develop this characteristic odor upon oxidation—that is, they apparently do not go rancid, although they may cause gumming. This is attributed to the non-formation in these oils of the odoriferous bodies. Enzymes and bacteria seem to have no effect upon the rancidity of oils, at least not directly.

A peculiar fact about the oxidation of oils is that for a certain period, known as the induction period, the oil may remain sweet with no evidence of oxidation or other changes, but after that, oxidation becomes marked and very rapid, the rate depending upon the oil and certain other conditions. According to Holm, Greenback, and Deysher, there are built up in the oil during the induction period compounds of high oxidizing potential, which later become the active agents in the actual oxidation of the oil. The induction period seems to be influenced in the same manner as the actual oxidation and by the same agents. The length of the induction period, under specified conditions, is taken as a relative, quantitative measure of the ability of the oil to withstand oxidation. It is found that ricinoleic acid or its glyceride (castor oil), although non-saturated bodies, have a long induction period. This resistance to oxidation has been attributed to the hydroxyl radical in the molecule which characterizes these oils. It has also been found that with the addition of foreign materials containing the hydroxyl radical, the induction period of oxidizable oils may be greatly prolonged. In fact it may be delayed so long that for all practical purposes, the treated oil may be considered stable—i.e., free from the tendency to oxidize, gum, or turn rancid. Ralph B. Trusler has investigated a large number of such compounds, known as antioxidants, and has developed a method for testing their efficiencies in preventing oxidation. The following are a few of those tested, the antioxidant being added in the amount of 0.5% of the oil:

Compound	*Percent Efficiency*
Phenol	68.2
m-Cresol	77.0
o-Cresol	83.1
p-Cresol	85.6
q-Naphthol	98.2

Take-up and Efficiency of Exhaustion

With silk of a given quality intended for a specific purpose, the take-up, or the amount of soaking ingredients left on the silk, is confined in practice to rather narrow limits. In the case of hosiery yarn, for example, the boil-off (which is a measure of the take-up) is usually either 23 or 25, with certain clearances customary to the trade. It is claimed that excess take-up is undesirable because it results in oily cones which become sticky upon drying. It may also waterproof the yarn, interfering with the proper absorption of moisture before knitting. According to W. P. Seem, crepe yarn with a take-up under 5% is sensitive to slight changes in humidity and temperatures; and therefore, these conditions must be carefully controlled to avoid considerable trouble in weaving. There is a difference of opinion among knitters as to whether yarn intended for full-fashioned hosiery requires more or less take-up than for seamless knitting, although it is generally agreed that in the former case more moisture is desirable. According to one writer, a boil-off of 25% is advisable for silk intended for a full-fashioned machine, and 23% for that intended for a seamless machine, the higher boil-offs, he claims, imparting to the yarn the softness and ability to retain moisture required on a full-fashioned machine, whereas on a seamless machine, more wiry yarn may be used. Another writer, on the other hand, reverses the quantities, claiming that the higher boil-off (which he does not recommend for full-fashioned hosiery) has a tendency to waterproof the fiber and prevent the proper absorption of moisture. He prefers the higher boil-off for seamless knitting, because the yarn, not being back-wound, depends for its softness and pliability entirely upon the soaking ingredients. According to Ditton high-twist yarn should be soaked softer—i.e., should have a higher boil-off; a boil-off of 23% for tram and 25% for high-twist yarn is recommended.

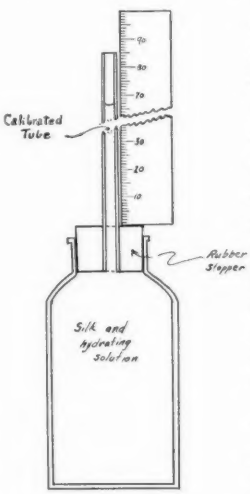


Fig. 1
Dilatomer. (See last issue.) Courtesy Ind. & Eng. Chem.

Since it is customary after soaking to discard excess liquor, some of the soaking ingredients naturally go with

(Continued on Page 831)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

President
P. J. Wood
Oriental Silk Printing Co., Paterson, N. J.
Vice-Presidents
William H. Cady—Alex. Morrison
Treasurer
Harry R. Davies
Secretary
A. Newton Graves
Franklin Process Co., Providence, R. I.
Councilors
Ralph F. Culver — George A. Moran
H. M. Chase — Hugh Christison
William R. Moorhouse — Walter M. Scott
President Emeritus and
Chairman of the Research Committee
Louis A. Olney
Lowell Textile Institute, Lowell, Mass.

Local Sections and Their Officers

Northern New England Section—
Henry D. Grimes, Chairman, Wood Worsted Mills, Lawrence, Mass.
Harold C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Rhode Island Section—
Leslie L. Bamberger, Chairman, U. S. Finishing Co., Sterling, Conn.
A. Newton Graves, Secretary, Franklin Process Co., Providence, R. I.

New York Section—
Robert H. Gaede, Chairman, Gaede Silk Dyeing Co., Paterson, N. J.
Clemens F. Hoppe, Secretary, Oriental Silk Printing Co., Haledon, N. J.

Philadelphia Section—
Charles A. Seibert, Chairman and Acting Secretary, 311 S. Riverside Walk, Penn's Grove, N. J.

Piedmont Section—
John L. Crist, Chairman, Calco Chem. Co., Inc., Charlotte, N. C.
J. D. Sandridge, Secretary, E. I. du Pont de Nemours & Co., Inc., Greensboro, N. C.

South-Central Section—
R. S. Wheeler, Chairman, Crystal Springs Bleachery, Chickamauga, Georgia.
J. D. Mosheim, Secretary, Crystal Springs Bleachery, Chickamauga, Ga.

Midwest Section—
Edward W. Morgan, Chairman, Morgan Dyeing & Bleaching Co., Rochelle, Ill.
William Bergh, Jr., Secretary, Vassar Swiss Underwear Co., Chicago, Ill.

South-Eastern Section—
E. A. Feamster, Chairman, Eagle and Phenix Mills, Columbus, Ga.
Charles Ordway, Secretary, Alabama Polytechnic Institute, Auburn, Ala.

Lowell Textile Junior Section—
Alfred J. Carbone, Chairman; Paul Duggan, Secretary.

North Carolina State College Junior Section—
R. A. Gilliam, Chairman; D. B. Hardin, Secretary.

CALENDAR OF COMING EVENTS

Meeting Northern New England Section, January 9th.
Council and Research Committee Meeting, Chemists' Club, New York, January 22nd.

THE ANNUAL MEETING

THE Annual Meeting of the American Association of Textile Chemists and Colorists was held at the Hotel Statler in Boston on Friday and Saturday, December 4th and 5th. Friday morning was given over to registration and Friday afternoon to sightseeing trips. Although not originally scheduled in the program, a very interesting trip through the Massachusetts Institute of Technology, was conducted by Edward R. Schwarz, Assistant Professor of Textiles at the Institute. The 76th Council Meeting and the 69th Research Committee Meeting were also held during the afternoon. Friday evening a buffet supper was served, followed by an informal technical session and entertainment. The technical session included a test for color blindness discussed by Dr. E. M. Smith of the Arlington Mills, a questionnaire on practical problems of wool dyeing prepared by John G. Masson of the Rosemont Mill and answered by Dr. E. W. Pierce of the Ciba Company, and moving pictures of an expedition to Venezuela shown by Carlton S. Francis, Jr., of the Celanese Corporation of America.

Saturday morning and afternoon were devoted to the presentation of a number of technical papers. A business meeting was held at noon and officers' and committees' reports were given. The results of the election of officers were also given at this time. The officers elected are as follows: President, P. J. Wood, Oriental Silk Printing Company, Paterson, New Jersey; Vice-Presidents, William H. Cady, Chief Chemist, U. S. Finishing Company, Providence, Rhode Island, and Alex. Morrison, Assistant Chemist, American Woolen Company, Andover, Mass.; Treasurer, H. R. Davies, President, Dyestuff Corporation of America, Boston, Mass.; Secretary, A. Newton Graves, Chemist and Purchasing Agent, Franklin Process Company, Providence, Rhode Island; and Councilors for three years, Wm. R. Moorhouse, Resident Manager, National Aniline and Chemical Company, Boston, Mass., and Walter M. Scott, Consulting Chemist, Gustavus J. Esselen, Boston, Mass.

Papers were presented during the morning and afternoon sessions by Dr. Robert E. Rose, E. I. duPont de Nemours and Co.; Miss Dorothy Nickerson, Bureau of Agricultural Economics, U. S. Department of Agriculture; Dr. W. N. Greer, Leeds and Northrup Company; Prof. Wilder D. Bancroft, Cornell University; Prof. E.

R. Schwarz, Massachusetts Institute of Technology; Dr. Milton Harris, Research Associate of the A.A.T.C. and C.; Dr. Henry Green, Tubize Chatillon Corporation; Prof. A. H. Grimshaw, North Carolina State College; and Dr. H. Meyer, General Dyestuffs Corporation. A paper by Peter De Loeuw of the Roessler and Hasslacher Chemical Co., scheduled for the morning session was not presented.

The final event was the banquet held in the Main Ballroom of the Statler on Saturday evening. About 500 members and guests were present. Henry D. Grimes, chairman of the Northern New England Section, presided as toastmaster. The guest speakers included President Karl T. Compton of the Massachusetts Institute of Technology, who outlined a research program for the textile industry; Hon. James M. Curley, Mayor of Boston, who discussed the textile situation in the United States and in New England in particular, and Bill Cunningham, Sports Editor of the Boston Post, who reviewed some of his experiences. Prof. Louis A. Olney and Elvin H. Killheffer, Past Presidents of the Association, were also called upon to speak.

Because of their importance to the trade, we are publishing herewith, the complete remarks of Dr. Killheffer:

Mr. Toastmaster, Mr. President, Honored Guests and Gentlemen of the Association:

We have in this Association, and in other associations interested in the same subject, talked very considerably during the last several years about research by and for the textile industry of the United States. Personally I believe just as firmly in the advisability of systematic cooperative research for the textile industry as I ever did but when I returned from Europe a few weeks ago I heard of various trends in some branches of the industry that I think run exactly contrary to any of the benefits or advantages that might be expected from a program of research and I should like on this occasion to voice something of a warning which may or may not have been overlooked by those of you most vitally concerned.

I think that you will all agree with me that the entire purpose of any research in this or any other industry is in the hope of making progress or of gaining something or improving our merchandise or our processes. What I am going to refer to briefly runs exactly counter to any such result.

I want to refer particularly to the case of the cotton printers. The same facts and the same reasoning may apply with equal force to other branches or fields but for the moment we will consider only the case of the printers and that briefly.

Let us go back a little and look for some of the causes of the good business volume enjoyed by the printers during the last years.

What were these causes? Well, without any claim to an enumeration of all the causes, we can certainly select a few that have been of great importance.

Advantages of Print Over Woven Fabrics

Print patterns can be changed with more ease and greater rapidity. This makes it possible to respond quickly to changes in fashion or styles. This greater operating flexibility tends toward a safer inventory position because goods can be carried in the grey and not subjected to coloring or finishing until practically the time delivery is wanted.

The ability to carry goods in the grey makes possible also a much greater variety of patterns.

While not a complete statement, these few observations nevertheless will serve to indicate or illustrate the general picture.

Now these particular advantages have been present for many years and yet it is only in comparatively recent years that printing has come so greatly to the front. Why is this? The answer to this question brings us to a consideration of one of its very important factors in the whole picture.

It is not so many years since bright, attractive prints were made by the use of two classes of dyes which, while brilliant, were unfortunately among the most fugitive we now know. This great lack of resistance or fastness to the various color-destroying influences, such as washing and light, very naturally placed decided limitations on the uses to which prints could be put.

With the appearance on the market of vat and other fast colors, the conditions just described began to change with great rapidity. Not only could all the advantages of prints over woven fabrics alluded to previously be realized by the manufacturer but more important still the results would prove so satisfactory in the hands of the ultimate purchaser that a real and unprecedented demand for printed fabrics would be and in fact was created. In other words, not only the attractive pattern but also the fact that they would withstand use, washing, light, etc., made for the success attained.

Now, as the volume of printing grew, there were firms who could see the wisdom of following to the ultimate conclusion, one at least of the more important causes or reasons for their success in the first place. They, therefore, not only used the group of fast colors, but they selected from the general group those colors having the greatest fastness. It must be remembered that all so-called fast colors are not equally fast, in fact, the differences within the general group are very large. Some vat colors will withstand the maximum of light exposure, of washing, of commercial laundering (where sometimes a slight chlorine bleach is encountered), etc., whereas others will be good in their fastness to ordinary washing but much poorer in fastness to chlorine or light.

We now come to an unfortunate chapter in this recital.

Competition, always keen, grew keener. Irresponsible factors began a competition wherein they approximated the character of high class goods but they made lower prices. To come out all right themselves they used less fast colors.

The first grade printers or printers of first grade goods began to cut their prices Price cutting, as it usually does, soon became very unintelligent and unwise. It wasn't long, therefore, until the largest, strongest and most able began a perfectly ruinous campaign against each other which has brought them to a point where it is impossible to show profits. To help themselves out of this dilemma they approach, no doubt, all of their suppliers of materials to get, if possible, lower and lower prices—but even when they have hammered prices of their raw materials down to the lowest point, they still continue their own price reductions in spite of the fact that their costs are no longer falling—in fact, as volume falls their costs of necessity go upward.

Now the sad part—To get out of a hole they acquiesced in a policy which cannot fail to react terribly against them.

In short, they decide to use lower priced colors. Note the distinction; not cheaper dyes, but lower priced ones. The only people to whom they might be cheaper are to the plants using them and the cheapness there would be in the end very expensive.

How about the consumer? Lower priced dyes are not cheaper in the end. Suppose your wife buys a washable print for a dress. Then suppose it changes entirely in washing or runs into the white. Is that dress cheap for you? Suppose you buy some new drapes which the sun quickly fades to a point where you must replace. Are they cheap? No, they may be low-priced but they are not cheap. We may say to ourselves that this argument is old and applies in a theoretical way to most everything we buy. The point is that while in a general way this may be true, in the case under discussion it is far more important because of the fact that in so many cases the color makes the material and, conversely, can and will ruin it. Printed goods and the producers of them will dig their own graves; for the reaction, while it may be slow at first, will sweep all before it when it comes.

I think there is no question but that what we have the situation where the producer of the goods of his own desire would much prefer to put out the most durable fabric he could and that at the other end of the chain we have the consumer of the goods, who certainly, for the small actual difference in cost, will always prefer the durable fabric. It means, therefore, that this demand for the use of poor stuff, which will make for poor merchandise, comes from somewhere in between the producer and the consumer. In other words, it comes from that part of the chain from producer to consumer where there is no interest save a money interest; that is to say, they are not particularly concerned or worried about the ultimate welfare of the producer and certainly they are flaunting the desires and the welfare of the ultimate consumer. It would seem, therefore, that some step that would put a definite check on this very undesirable and very dangerous situation that confronts the textile manufacturers and more particularly the printers, would be a long step in the right direction. It seems to me that there ought to be a definite campaign through some association or several associations, the effect of which would be to bring the producer and the consumer closer together.

Real genuine cheapness to the consumer should and can be a reality instead of a myth and genuine cheapness should never be confused with low price.

The meeting adjourned until next year when the Association will be the guests of the Piedmont Section.

Complete reports of all meetings held and papers presented will appear in forthcoming issues of the AMERICAN DYESTUFF REPORTER.

NOVEMBER MEETING, SOUTH CENTRAL SECTION

THE South Central Section of the A. A. T. C. & C. met in regular session at the Hotel Patten on the 21st of November, 1931. After an enjoyable dinner and social session, the meeting was called to order by Vice-Chairman Noel D. White.

The minutes of the previous meeting were read and approved.

There followed a series of talks on the changes in style and dyeing of hosiery since 1920. These were given by Mr. Nestor Grotelueschen, Mr. Milliken, Mr. DuBois, and Mr. Kenneth McKenzie. These excellent papers provoked a general discussion which proved very interesting and helpful.

It was announced that a general election of officers would be held at the next meeting, and a nominating committee was appointed, consisting of Mr. H. A. Rodgers, Mr. DuBois, and J. D. Mosheim.

There being no further business, the meeting was adjourned.

Respectfully, submitted,

J. D. MOSHEIM,
Secretary.

Proceedings of the American Association of Textile Chemists and Colorists

Bleaching Troubles on Cotton and Wool Hosiery

By L. E. MILLIKEN

MR. CHAIRMAN and Friends: After reading the notice of this meeting I was very much impressed with the plans of the meeting. I thought it would be a profitable meeting for all present, not knowing who the speakers were to be. I then received a letter from my friend, Mr. White, telling me that he was going to call on me for a talk. He did not say he was going to ask me if I would make a talk on my dyehouse troubles.

Well, let me say now that I will not expect to have the influence over you gentlemen that the high-powered salesmen of whom I heard had over the policeman. The salesman decided to drown himself. He went out on the bridge. Just as he was fixing to jump into the river a policeman came along and hollered at him telling him not to do that. "Let us walk around and talk it over." So they walked around the block and came back and both jumped in.

I will try to tell some of my troubles in bleaching with Solozone and Chlorine on cotton and mercerized goods. Some years ago we had a very small filter and also had a direct pipe line from a spring on the mountain, but the water was so hard that we had many "redyers" caused by soap curdles. We finally overcame this to a great extent by using a concentrated soda ash. Then later on the spring would not furnish the amount of water needed and the city water company did not have a water filter at that time. So we had to use water from the river. Then we had mud streaks in our boil-outs. To overcome this we put in a zeolite plant. This eliminated my bleaching trouble on cotton.

Later on we were going on to wool. They wanted some bleached wool hose so I took some scrap hose, put them into a bag, and put them into my regular cotton peroxide bleach run. They came out as "mush." Then I put some more scrap into a chlorine bleach. When they came out they looked like they had been dyed yellow. So then I took another scrap and put it into a monel cup and tried to bleach it with peroxide on a hot plate. It started bleaching fine but in a few minutes I noticed that it looked as if some one had thrown some yellow dye into the cup. So I dumped this out and cleaned the cup well. I then started another one the same way. I watched this carefully and then in a few minutes I saw the chemical reaction take place. This one looked just the same as the other one. I finally learned that wool could be bleached in a wood machine—not over 140° Fahrenheit.

I remember another time I was running plaited rayon ladies' hose. The man who was running the bleaching machine let it boil, so that when the goods went to the boarders the rayon all came off. The boarders' table looked as if it had been snowing. It took me some time to find out what the cause was. I thought this might be a benefit to some of you.

I will give you a sketch of my equipment. I have two hundred pound, two fifty, and three, twenty-five monel paddle machines; and two three-hundred rotary monel lined; one ten all monel machine and also three forty-two inch basket and one thirty-six inch basket electric driven extractor.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN ALBIN JOHNSON
Managing Editor

MYRON DREW REESER
Advertising Manager

Published biweekly by
HOWES PUBLISHING CO., INC.
440 Fourth Avenue, New York City

A. P. HOWES, President — M. D. REESER, Secretary — H. F. CRAWFORD, Treasurer

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00

Vol. XX December 21, 1931 No. 25

WELCOMING 1932

WITH the close of 1931, we naturally turn our thoughts to the coming year, making new resolutions, or, if we are exceptional, sustaining old ones. If we are retrospective, we look back over 1931, rejoicing again in our successes and try to forget our failures. Perhaps the way in which we prospered or failed during the last year will influence our thoughts toward the future. We cannot say one should forget the past completely as we should have gained something, and if so, we should retain it. If we lost we have the ever present opportunity to win again. Life is continuous. We cannot live each separate year apart from the others. We run the total of them together. A mistake which is rectified loses some of its sting. In the same manner the glamor of a brilliant accomplishment is dimmed by the gloomy prospect of a setback.

Success or failure cannot be determined by the events of a single year. It is the average of a lifetime that determines our status. In the same way, when a firm balances its accounts at the end of a year, one cannot say it is either a success or a failure. We have fat years and we have lean years. It is the final average that sums up our position in the business world.

We should all welcome the new year. If we have failed in the past, we have a chance of redemption. If successful, there is every chance for the continuance of such. This is determined by ourselves and by those with whom we work and do business. "From the president to the office boy," the new year represents a chance for improvement or advancement. Although the path to the house of the mouse trap maker may have grown up in grass during 1931, by the end of the next year it may again be well beaten.

There is no particular reason for increased or diminished effort at the start of a new year. A year is an infinitesimal chronological division of time which, we might add, goes on forever. It is convenient, in a business sense, that we have such a division. It affords an opportunity for rechecking and inventory. But we should not plan for the year alone, we should plan for the entire future. The future is a vague term, with a broad meaning, but it represents all that lies ahead of us, immediate and distant. How can we succeed if we have no thought of the future? Immediate prosperity means but little when life is completed. Neither should we lose confidence while laboring in the sloughs of depression.

At the same time, we should not forget the past. Mistakes may be turned to our profit, if we would have them do so. It is a common saying that the past is dead and buried. This cannot and should not always be true. It is very true that what is done has been done and cannot be changed. However by the proper analysis of past experiences we gain something that can be gained only through experience. It may be true that a smart man learns from his own experience and a wise man from the experience of others, but it is sometimes difficult to adapt another's experience to our individual cases.

What do we mean by success? To one person it may mean the accumulation of wealth, to another the attainment of a specified goal and to another the accomplishment of an ideal. It is a matter of personal feeling. Whereas a person may be successful in one certain item, he may be dissatisfied because he is not successful in something to which he attaches greater importance. And so, let us all welcome 1932 and go after our heart's desire.

HINTS TO AUTHORS

THERE are some rules of punctuation that are almost universally observed, many other rules that are observed by some people, and some rules that hardly anyone observes. Most all authors have their own ideas about punctuation which they believe are better than other people's ideas. There are many different styles of writing, which vary quite a bit, and for which different styles of punctuation are suitable. The result of all this is that there are many different styles of punctuation. The author has one style which he follows, his typist another, the editor of the journal a third, his assistant still a different one, the print shop's compositor and proofreaders have yet a still more different style, and so on down. When an article has once been set up in type, alterations are expensive, and so an author who uses a peculiar style of punctuation, different from the general run, is of course of annoyance.

Styles change in the matter of punctuation as much as in manners of dress. Writers who follow the style of the old masters are, therefore, antiquated. Some newspapers and journals are very careless in their punctuation, but this journal belongs to a class of periodical literature that should strive for uniformity.

More time is wasted over debatable points of punctuation than is generally believed. As a general rule an editor is more obstinate than an author and is just as ignorant, but being in closer contact with the printer, his notions receive more consideration. If an author takes pains with his punctuation and knows his subject, and wishes his paper to be printed exactly as written, he should state this on his manuscript, and his wish will probably receive some consideration. It is to be remembered that in deciding on forming a style of punctuation, usage is everything and logic is inconsequential. No particularly hard or fast rules can be laid down for the use of a punctuation mark, but if the style, as apparent in this journal is followed, it will be more of what is decided. Simplicity in punctuation is desirable. Authors are in a position to help the publisher a great deal if they would follow a few simple rules as to punctuation, spelling, accuracy, and style of expression.

Many authors seem to be ignorant of what is required in the matter of illustrative material. A large drawing can very easily be brought down to the correct size when the cut is made. Many imperfections which appear on a large sized sketch will disappear when the finished cut is produced. The above is not true of sketches which are small size. When graphs are plotted on cross section paper, blue lined paper should never be used, since the photographic process used in producing electrotypes does not satisfactorily reproduce blue lines, even though color screens are used. Black is the best to use in all cases. A special cross section paper is available for use where electrotypes are to be prepared later. In the case of photographs, glossy prints should be submitted.

There are a number of books published on the art and style of writing. If the editor cannot find one of these to agree with him, one of the others probably will. (With thanks and apologies to *Chemistry and Industry*.)

HERVEY C. MORRIS

Hervey C. Morris, service expert in the naval stores department of the Hercules Powder Co., died on November 16. He had been connected with the company for the past eight years. Several years ago, Mr. Morris was transferred to the company's naval stores plant in Brunswick, Ga., but for the past four years he had been acting as traveling representative for the company, making his headquarters at the home office, Wilmington, Del.

HUGH A. MURRAY

It is with the deepest regret that we learn of the death of Mr. Hugh A. Murray of the Noil Chemical and Color Works of New York City. He has been president of the company since its inception and was well known and favorably regarded in the trade.

Mr. Murray's sudden death occurred on Thursday, the third of December, as the result of a serious automobile accident in Canden, South Carolina.

Textile Research to Be Reviewed

For the first time in the history of the textile industry a review of textile research, similar to annuals that have been published for sometime for the chemical and other industries that are leaders in scientific research, is to be published by the United States Institute for Textile Research, Inc., covering results for the year 1931. This initial issue will be dedicated to the memory of its late president, Dr. Samuel W. Stratton, and will bear the imprint of the Publications Department of the Massachusetts Institute of Technology, Cambridge, Mass.

The Board of Editors of the Annual consists of Prof. E. R. Schwarz, Mass. Institute of Technology, chairman; Dr. W. E. Emley, Bureau of Standards, Washington, D. C.; E. D. Walen, Pacific Mills, Lawrence, Mass., and Prof. L. A. Olney, Lowell (Mass.) Textile Institute. Each chapter will be contributed by a recognized authority on the subject covered. The volume will be ready for distribution early next spring.

Publication of the Annual was authorized by the executive committee of U. S. Institute at its meeting at the University Club, Boston, Mass., Dec. 4, and initial plans were discussed by the research committee at its meeting at Lowell (Mass.) Textile Institute Dec. 7. The next meeting of the latter committee will be held at the Chemists' Club, New York City, Thursday, January 21, and the next meeting of the executive committee and the board of directors will be held at the same place the following day.

Coal-Tar Dyes Decline in India Imports

The following table shows quantity of imports of alizarine and aniline dyes into India by countries of origin in the last two fiscal years. Synthetic indigo was also imported to the quantity of 1,120,000 pounds, mostly from Germany and Switzerland.

	—Alzarine Dyes—		—Aniline Dyes—	
	1929-30	1930-31	1929-30	1930-31
	Pounds	Pounds	Pounds	Pounds
United Kingdom .	1,405,000	724,000	990,000	821,000
Germany ...	3,585,000	2,369,000	9,171,000	9,494,000
United States	76,000	107,000	1,511,000	1,156,000
Netherlands .	213,000	1,000	81,000	23,000
Switzerland .	49,000	40,000	707,000	487,000
Belgium ...	.....	.....	55,000	59,000
Other countries .	.....	.....	804,000	779,000
Total	5,328,000	3,241,000	13,319,000	12,819,000

Correction

We call your attention to the John Campbell advertisement on Page III which contains several corrections which should have been made on their December 7th advertisement.

Theoretical and Applied Silk Soaking

(Continued from Page 816)

it. The ratio of oil deposited upon the silk to the loss of oil in the waste liquor varies considerably and depends upon the following factors: volume and temperature of the bath, time of soaking, character of soaking ingredients, whether tub or machine soaking, acidity and nature of the silk, and porosity and other conditions of the skeins. To obtain a given take-up by manipulating the concentration of the bath is comparatively simple. The problem, however, becomes rather involved when the efficiency of the process is also taken into consideration—i.e., the use of the minimum amount of oil to attain the proper take-up; or in other words, the efficiency of exhaustion of the soaking ingredients in the bath. In general, take-up is found to be greater than the amount calculated from the original concentration and the weight of liquor left in the centrifuged silk. As already mentioned, soap and oil give greater exhaustion than soluble oils; but the latter give finer emulsions and more uniform results. According to Seem, the following exhaustion values prevail in practice: for soap and oil, 40 to 60%; for straight sulphonated oils, 15%; for sulphonated oils compounded with olive or neatsfoot oil, 40 to 60%; and for sulphonated oils compounded with mineral oil, 40 to 80%. Exhaustion as high as 96% is claimed for machine soaking.

Dispersion and stability of the emulsion seem to be very important controlling factors in the exhaustion of the liquor. It is often stated that, as a result of better penetration, the finer the dispersion and the more stable the emulsion, the greater the take-up and exhaustion. This is contrary to the unpublished work of Hart and Searell, who find that the less stable, and consequently the coarser, emulsions give the greater take-up and exhaustion. Thus, under identical conditions they obtained a take-up of 8.9% with an acid soluble oil and only 4.8 when the bath was neutralized, producing a more stable emulsion. Further, they found that the greater the addition of raw oil to the sulphonated oil the greater the take-up. They also confirmed the statement by Seem that soluble oils when compounded with mineral oil give greater take-up than when compounded with saponifiable oils. Thus, a take-up of 8.9% was obtained with mineral oil compared with 5.2% when the mineral oil was replaced by olive oil. The greater exhaustion obtained with soap and oil may thus be explained on the basis of the comparatively unstable emulsions they produce. The addition of salt to the bath, which is sometimes practiced, acts in a similar manner, in that it de-stabilizes the emulsion by neutralizing the electrical charges of the emulsifier, causing loss of repulsion between the oil particles with the subsequent conglomeration of the oil droplets. Hart and Searell found that in the case of certain commercial emulsions with soap and oil, 60 to 70% of the total neutral fat in the bath had separated and was present in the upper, narrow layer. Louis Meunier and Jacques Corbiere have made a study of adsorption by wool fibers from emulsions of olive oil stabilized with ammonium oleate. They found that oil particles less than 1 mu in diameter were not adsorbed, particles of 2 mu were adsorbed in the greatest number, but the largest mass of the adsorbed oil was accounted for by a comparatively small number of 8-11 mu droplets. Hence, the amount of oil adsorbed increases with the increase in size of the particles, or coarseness, of the emulsion.

Hart and Searell find that sericin has a very strong demulsifying effect upon oil emulsions, which may be remedied, however, by the addition of alkali. Sericin also exerts this influence upon acid self-emulsifying oils, making the take-up in such soakings greater than would have been otherwise. Furthermore, the writer believes that the mechanism of adsorption of soap by silk is probably as follows: The silk first combines with the alkali of the soap, liberating free fatty acids. These now in the form of a coarse emulsion, are next adsorbed by the fiber, the net result being an adsorption or loss of soap in the liquor.

Instability of the original emulsion, aggravated by the action of sericin, gives rise to unequal distribution of the soaking ingredients throughout the bath, ultimately producing uneven take-up of oil by the yarn, with a tendency for the greater take-up towards the top of the soaking vessel.

In the case of an oil emulsion stabilized by soap, the difference in take-up between the top and bottom skeins may be considerable. This was shown by Hart and Searell in an experimental soaking in which they found that the skeins on top gained 14.9%, whereas those on the bottom gained only 9.7%. In a commercial soaking, however, the difference was not so marked and the soaking was more uniform, possibly because the oil on its upward course becomes entrapped among the fibers. When the separation is large, the scum is apt to be deposited as a heavy layer on the surface of the silk, causing sticky yarn that will absorb moisture with difficulty prior to knitting. Uneven soaking, it is claimed, is largely overcome by the use of properly adjusted, self-emulsifying soaking oils, and for that reason they seem to be preferred by the knitting manufacturer, to whom uniformity in all essentials is of paramount importance. Other advantages claimed for such oils are that they are easier and safer to use, give better penetration, exert a greater antiseptic effect, do not dry out so much, and possess greater and more uniform moisture-abosrbing properties. The take-up and efficiency of exhaustion may be greatly improved by the proper adjustment of the soluble oil and the conditions under which it is used.

Among other features to be taken into consideration when dealing with take-up are: (a) ratio of volume of liquor to silk, (b) temperature of the soaking bath, and

(c) time of soaking. It was found, that above sufficient liquor to amply submerge the silk, approximately equal amounts of liquor will be absorbed. Hence, the smaller the water factor the greater the efficiency, obviously since less liquor is then thrown away. Evidently a limiting case of 100% efficiency is obtained when the volume is so small that all the liquor is left in the silk.

According to a recent article there is also a best temperature which gives the highest boil-off; below which, penetration is slow and poor, giving a lower boil-off. Above that temperature, the boil-off is likewise low, partly because adsorption phenomena decrease with temperature and partly because the higher temperature may make the emulsion more stable. In this connection the following data are given, which indicate an optimum temperature of 85°F:

	Boil-off Percent
Raw Silk	18.3
Soaked for 5 hrs. at 70°F.....	21.8
Soaked for 5 hrs. at 85°F.....	24.3
Soaked for 5 hrs. at 100°F.....	20.8

As for the time of soaking, Neville and Marshall found that at 37.8°C. (100°F.) and under practical conditions silk and the emulsion reached equilibrium at the end of five hours. Hart has shown that equilibrium in a soap solution, as determined by the adsorption of alkali, was practically complete after eight hours. Hence the maximum take-up for practical purposes, so far as time of soaking is concerned, may be expected to occur between these intervals.

Tub Soaking vs. Machine Soaking

Silk-soaking is usually conducted in monel-lined wooden tubs of cubical dimensions and large enough capacity to treat 100 pounds of yarn. Bath tubs have also been recommended for the purpose, since the bundles of silk may then be arranged in a single layer instead of being piled upon each other as in the conventional square tube, and more uniform penetration obtained. In preparing an emulsion of soap and oil, the soap is first thoroughly dissolved in a small quantity of hot water, then mixed with the rest of the water, and finally the oil is gradually added with vigorous stirring, preferably with a mechanical agitator. Intermittent stirring, it has been found, also helps in the better emulsification of oils.

For greater uniformity of adsorption of the soaking ingredients, it is suggested that some of the emulsion be poured in before submerging a layer of silk. This is followed by more liquor, preferably sprayed in, and then by another layer of silk which is laid across the previous one. The process is thus continued until all the silk is finally soaked.

In the last few years an attempt has been made, with more or less success, to replace the tub method by machine soaking, in which the liquor by one means or another is caused to circulate through the yarn. In the Franklin Process Silk-Soaking Machine, shown in Figure 2, the silk (usually a full bale) is placed in a kier or tub between perforated plates and by means of a centrifugal pump at 10 to 15 pounds pressure, and the liquor is forced through the yarn first one way and then the other. In this type of soaking it is not necessary to untie the bundles, but only open the noses of the skeins. The Gates-Pfeiffer Emulsifier is another machine of this type for which claims are made, so far as hosiery is concerned, that it eliminates sleaze (dry stitch), takes moisture evenly, makes possible more uniform lengths, and reduces both seconds and waste (press-offs).

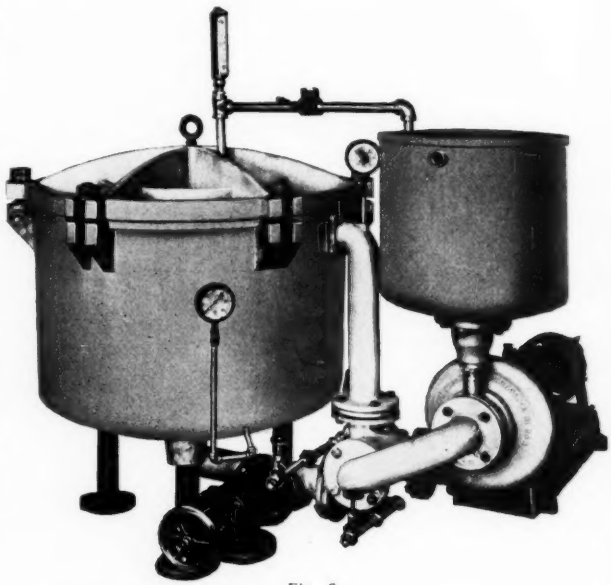


Fig. 2

Franklin Process Silk Soaking Machine. Courtesy Franklin Process Co.

Another machine for this purpose, manufactured by the American Laundry Machine Company, produces penetration and circulation of the liquor in a different manner. This contrivance consists of a tub, accurately machined on the inside, in which a hollow piston with a perforated bottom is made to slide. The silk and liquor are placed in the tub and the piston lowered on the silk, subjecting the latter to considerable pressure and forcing the excess liquor through the perforations into the head of the piston. The necessary pressure is obtained by means of a suction pump connected with the hollow piston by a pipe running through the bottom of the tub, creating a vacuum on the inside of the system. After attaining the maximum vacuum, atmospheric pressure is restored by means of valves located on top and on the outside of the piston. The head is then raised, allowing the compressed silk to expand through the liquor, which is readily absorbed upon coming in contact with the fibers freed from adsorbed air by the pressure. This cycle is repeated as many times as necessary to obtain the required take-up. Obviously the process is essentially equivalent to alternate compressing and releasing of the silk while immersed in the liquor. As an improvement, the writer

has suggested the removal of excess liquor while the silk is still under pressure, since data are available to indicate that the yarn in that condition is sufficiently dry not to require centrifuging.

The advantages claimed for machine soaking are (a) saving in time, (b) better penetration and greater uniformity in take-up, and (c) greater exhaustion of the bath. The most striking feature seems to be the saving in time. In the circulating-type machines, the process is completed within two hours; with the piston machine, in about ½ hour, compared with 8 to 20 hours for tub soaking. The fact that machine soaking has proved practicable indicates that, as long as proper wetting-out is accomplished, softening and plasticizing of the sericin can be attained in a much shorter period than was heretofore thought possible.

In the open tub method it is claimed that soaking proceeds mainly by capillary attraction. The process is unduly prolonged because the outer strands of a bundle must first absorb the emulsion almost to its capillary capacity before it will relinquish any of the liquor to the adjacent strands. Seepage, however, may help penetration considerably. Nevertheless, this method, it is stated, does not present the soaking liquor to all strands and all surfaces of the silk at the same time. It is also said that because of separation of the soaking ingredients and partial exhaustion of the bath by the strands that have already received treatment, the liquor when presented to the untreated strands is not of the same composition and concentration. The open-tub soaking is therefore subject to uneven and sometimes insufficient softening, as well as unsatisfactory exhaustion of the bath. In machine soaking it is claimed speed and uniformity of soaking is obtained because the hydraulic pressure presents the liquor to all strands and all surfaces of the silk at approximately the same time, and because the circulation or agitation of the liquor and the fact that the rate of circulation is greater than the rate of absorption by the fibres keeps the solution emulsified and uniform. Due allowance must be made, however, for possible channeling in this type of soaking. The possibility of greater uniformity in an agitated soaking as compared with still soaking is strikingly shown in the unpublished work of Hart and Searell. They soaked two skeins in a mason jar, one over the other, for 24 hours using a commercial self-emulsifying oil; the experiment was repeated agitating the liquor by means of a tumbling arrangement for a period of 8 hours. The upper and lower skeins in each case were finally analyzed for take-up, with the following results:

TAKE-UP

	24 hours Still Soaking Percent	8 hours Agitated Soaking Percent
Upper skein	8.43	5.73
Lower skein	5.12	5.87

The strongest argument advanced by the advocates of machine soaking is the high efficiency of exhaustion, as high as 92% in an interval of two hours being reported. The writer believes that this is possible only in the case of soap and oil, when the emulsion is comparatively unstable and the oil is readily absorbed when it comes in contact with the fibre. It is doubtful, however, whether any such exhaustion figures are obtained in the case of soluble-oil soakings, which give finer dispersion and more stable emulsions. On the contrary, the writer found that the exhaustion in an agitated soaking was even less than with the tub method. This was attributed to the fact that the sericin at first cracks the emulsion, but upon dissolving and combining with the alkali in the soaking bath, becomes an excellent emulsifier; the liquor, however, must be shaken in order to derive the benefit of the sericin emulsifier. Hugh H. Mosher states that sericin consists of two fractions, sericin A and sericin B, and moreover that sericin B possesses, when properly peptized, truly remarkable dispersive and adsorptive properties, forming very stable emulsions with oils, fats, and

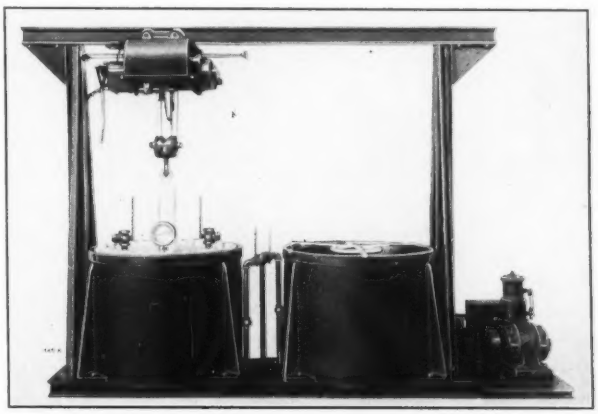


Fig. 3

American two tank "double unit" silk impregnator showing impregnating tanks, vacuum pump units, and hoist and spray head. Courtesy American Laundry Machine Co.

waxes. This was indirectly corroborated by Hart and Searell, who determined the drop numbers, against a white mineral oil, of the liquors of a soluble-oil soaking to which excess alkali had been added. They found that the drop number before soaking was 1204, and after soaking, 2605, representing a considerable drop in the surface tension of the solution. The water value of the instrument was 13 drops. It is therefore questionable whether machine soaking with soluble oil emulsions will show better exhaustion than tub soaking. In the piston-machine type, however, a comparatively small liquor factor may be employed, thereby tending towards a higher degree of efficiency in so far as consumption of soaking ingredients is concerned.

The suggestion has been made of soaking in a centrifugal machine. According to this proposal, the liquor

would be sprayed upon the silk in the machine while being centrifuged, and excess liquor would be pumped and again sprayed upon the silk, making the process continuous until the desired results were obtained. Hart and Searell have done some work on the method, but with the ordinary high-speed centrifuge, operating at 1800 r.p.m., the results were not satisfactory. Contrary to expectations, the high centrifugal force failed to produce uniform absorption, due apparently to channeling. The take-up was particularly poor at the twists and upon that portion of the silk touching the rim of the basket. There was also at times very bad snarling of the yarn, especially where the spray hit it. The method was modified by giving the yarn a preliminary wetting-out before introducing the regular emulsion. Although considerable improvement was noted, the results were still not so good as could be obtained by other methods. This method, however, is still under investigation.

Analysis of Silk Oils

Soaps and oils intended for soaking are examined by the usual standard procedures. Self-emulsifying silk oils or soluble oils, consisting usually of mixtures of sulphonated oil and raw oil with or without mineral oil, are best tested by the methods employed in the analysis of sulphonated oils. Wherever possible in the analysis of sulphonated oils, the writer prefers titration methods, since they not only save time but also give a better picture of the composition and properties of the oil. Soap in soluble oils is determined by titrating a water solution of the oil with acid in the presence of methyl orange. The amount of soap in such oils varies from 2 to 10%. Free acidity is found by titrating wtih alkali a sample of the oil dissolved in neutral benzol-alcohol, using phenolphthalein as the indicator. Soluble oils may have an acidity of from 1560 mg. of KOH per gram, or the equivalent of 7½ to 30% fatty acids. The saponification value is determined in the usual way, this test, together with the others, enabling one to approximate the total saponifiable fat content of the sample. The difference between the saponification value and the acidity number gives approximately the amount of neutral fat present. The neutral fat may have been part of the sulphonated-oil base or added as raw oil, a point which is often impossible to determine. As a rule, it is not a simple matter to identify accurately the nature of the sulphonated oil, although sulphonated neatsfoot oil may often be recognized by its odor, especially upon warming. Mineral oil or unsaponifiable matter is determined after the saponification test, as follows: The mixture is made 50% alcoholic, extracted with petroleum ether, and the residue weighted. The nature of the mineral oil is approximated from its color, specific gravity (made by the alcohol-drop method), and, if sufficient material is available, its viscosity. The mineral oil is usually a fully refined white oil having a viscosity below 100 sec. Saybolt at 100°F. Water is preferably determined by the xylene or distillation method; the drying method is not recommended because of the possible presence of more or less volatile oils. Combined SO^3 may be determined by the writer's titration method, recommended by A. H. Grimshaw, G. W. Searell, and others. Commercial soluble oils may contain from 1½ to 5% organically combined SO^3, depending upon the amount of the sulphonated-oil base. Cold test, color, nature of the emulsion and stability of the oil upon storage are also determined, usually by comparing with a standard. Special methods are necessary in the event that the oil contains such substances as diethylene glycol, glycerol, antiseptics, ammonia, triethanolamine, etc.

The stability of the emulsion and the tendency to separate under actual soaking conditions may be determined relatively in the following manner: Two skeins, placed one on top of the other, are soaked in a closed jar with just enough emulsion to cover them. The concentration in the soaking ingredients of the liquor before and after soaking and the difference in take-up between the top and bottom skeins indicate the permanency of the emulsion and the tendency of the oil to concentrate on the top of the vessel. Of course the final and most important test is the actual running of the treated yarn upon the machines under normal conditions.

Analysis of Soaked Silk

To determine take-up or the soaking ingredients left upon the silk, a sample is boiled in several portions of alcohol, then extracted with ether, the combined liquids evaporated, and the residue analyzed according to the procedure given for soaking oils. Chamberlin claims that inaccurate results are obtained in determining moisture and take-up of soaked rayon by the usual methods. This he attributes to the partial volatilization of the oil while heating the sample for the moisture determination. He therefore recommends that moisture be determined by the distillation method, and that take-up, by the total loss of the sample upon extraction with solvents from which the per cent moisture is deducted.

H. E. Bishop confirms this finding in the case of soaked silk, stating that with moisture determined on one sample and the boil-off on another—heretofore the usual procedure—the sum of the two determinations (due to unequal volatilization of the oils) does not agree with the total loss when the two tests (separately or combined) are made on the same sample. Thus, in one case a total loss of 35.7% was found by the two-sample method as compared with 31.63% by the single-sample method. Since partial volatilization of the oils upon heating vitiates the accuracy of both the moisture and boil-off determinations, Bishop recommends the "clean-fibre" test or the total loss determined on one sample and in one operation. The clean-fibre test is now the official quantity test on thrown silk of the Silk Association of America, Inc.

In the boiling-off test, the sample, according to the U. S. Testing Laboratories, is given two separate half-hour boilings in a 1% soap solution, rinsed twice in tepid water between boil-offs, and four times after the final boiling. The solution is prepared by taking a quantity of soap equal to 25% of the dry weight of the silk and water equal to 100 times the weight of soap. The boiled-

off samples are air-dried and then heated in the conditioning oven to constant weight.

Sleaziness

The term "sleaziness" in the hosiery trade is applied to uneven knitting, consisting of groups of distorted stitches, either shorter or longer than a well-formed stitch, and showing twisted or irregular formation. The cause most frequently referred to as being responsible for sleazy knitting is dry silk, or rather silk that is not uniformly wetted or conditioned. Wet silk, on the other hand, may likewise be responsible for distorted stitch construction, which is just as disagreeable in appearance as that caused by dry or hard silk. It is stated that other causes for sleaziness, mostly mechanical, are uneven tension, improper alignment of needles, and improper setting of sinkers. Sleaziness is usually intensified after degumming when the stitches are more clearly defined and free from strain.

There are many methods in vogue for imparting the necessary moisture to the silk in order to avoid sleazy knitting, especially in the case of high-twisted yarn, such as Grenadine and hosiery crepe. A good many knitters resort to backwinding, that is, the yarn is passed through a special solution, rewound, and often conditioned. Others immerse the cones in a dipping fluid, and still others knit direct. It is interesting to note, in the trade journals, the often contradictory experiences reported on the subject by practical men. One states that he simply soaks the silk for 10 minutes before knitting; his silk comes on aluminum cones and is wound in what is known as "open wind". Another, who also knits direct, states that his experience with Grenadine has been that too much moisture will not produce a good fabric, and that a felt pad moistened is all that is necessary for the silk to run over before entering the needles. These statements are contradicted by other manufacturers who claim that in the operation of full-fashioned machines it is desirable to have the silk thoroughly wet by backwinding and to allow enough time for the silk to become thoroughly softened before being run. One knitter states that in a number of years of experience in full-fashioned work, he has tried silk from practically all of the large concerns, and he has yet to find a silk that could make a better fabric without the old-fashioned method for backwinding. According to still another, the best method is to place the silk in a conditioning room for at least 24 hours, when the silk will become evenly moistened.

The composition of the backwinding solution is also a matter of uncertainty among practical men. Glycerol to the extent of 1 quart to 15 gallons of water has been recommended by some for its hygroscopic properties, and denounced by others as the cause of stickiness in silk. C. H. Baxter believes that the best and safest solution to use for backwinding is a 1% solution of the oils used in soaking the silk before throwing. It is stated that an improper backwinding solution will cause the finished hosiery to have crepe stitches.

D. S. Chamberlin states, in a recent excellent article, that many knitters condition their yarn for 24 hours at temperatures of 90° to 95°F and relative humidities above 95%. The maximum moisture absorption by the silk threads under such or even more favorable conditions, he finds, is about 15%, compared with about 50% obtained in backwinding the silk. Silk is often conditioned after backwinding to prevent too rapid drying out of the yarn, and furthermore to allow equalization of the moisture throughout the yarn on the cone. Ditton advises that many manufacturers condition their silk also before backwinding so that it will be in a better shape to absorb the backwinding emulsion or solution. Dipping the cones in weak emulsions or water gives a moisture content of 150 to 200%, which with the ordinary cone may take from several minutes to an hour for penetration. Excess moisture in dipped cones may cause over-softening of the yarn, with a tendency for the threads to stick to the cone or needles. Methods have also been tried of wetting-out the yarn directly on the machine by conveying it through an atmosphere of hot water vapor, generated by heat that is thermostatically controlled and usually operated at temperatures of 100° to 160°F. The temperature must not be too high because of the softening effect upon the silk sericin. He further states that there is a relatively small percentage of knitters who run yarn direct, the only aid to wetting-out being the troughs on the machine. In such cases "hygroscopic" silk is used that is, silk which contains moisture-retaining agents introduced during soaking. Hygroscopic silk, he finds, does not wet-out uniformly and the dry spots cause irregular stitches and a sleazy fabric. The hygroscopic treatment of a soft-natured silk has often resulted in a calamity in hosiery knitting, since the hygroscopic substances are generally also softening agents. Apparently there is a great need for further experimental work on this phase of silk processing.

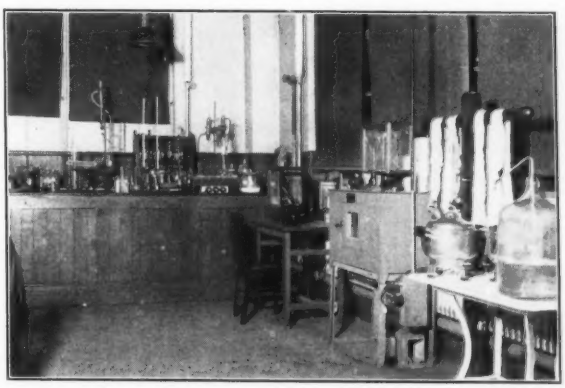


Fig. 4
Chemical laboratories of Kahn & Feldman, Inc.

In closing, the writer wishes to express his indebtedness to Herman Feldman, treasurer of Kahn & Feldman, Inc., in whose laboratories the investigations on soaking, backwinding, and degumming of silk are in progress, for the facilities extended in this work and for many practical suggestions.

The Treatment of Waste Liquors From Dyeworks*

Satisfying Demand for Pure Effluents

By S. R. TROTMAN, M.A., F.I.C.

The treatment and disposal of waste products is a problem which is inseparable from industrial chemical processes. If this waste can be recovered in a fairly pure state or used as the starting-point for other processes, they may actually be a source of profit. When, on the other hand, they cannot be recovered or utilized, their disposal becomes an overhead charge, unless they can be discharged directly into the public sewers. This is permissible, as a rule, in large towns, since the volume of the waste liquors forms only a very small proportion of the total sewage, and does not therefore inhibit purification.

WHEN the waste liquors amount to, say, one-quarter or one-half of the total volume of sewage to be dealt with, the discharge of untreated liquors into the main sewers cannot be permitted, owing to the fact that the chemicals would be present in a sufficiently high concentration to inhibit bacterial purification. In such cases the liquors must be subjected to a preliminary process of purification or turned into a river or stream, if one be available. The last method of disposal is subject also to the conditions mentioned above. When the volume of the waste liquor is small compared with that of the stream, no trouble may arise, but if the stream be a small one complains are certain to arise. The bed of the water course may become silted up with mineral matter; suspended matter entangled in the gills of fish may prevent respiration, or deaeration of the water may cause their suffocation. Fish are very sensitive to changes in the composition of the water in which they live. Moreover, mere traces of acids, alkalis or chemicals such as phenol or compounds of chromium are actively poisonous to them.

Cattle are less sensitive than fish, but the continued drinking of polluted water is accompanied by loss of condition and in some cases death. Formerly it was the custom to discharge all sorts of untreated sewage and trade waste liquors into rivers or streams. Today county councils and river boards are doing their best to prevent this, and prosecutions in connection with pollution are not uncommon.

The difference between the chemical constituents of an unpolluted stream and the same stream after pollution may be illustrated by the following figures which represent parts per 100,000, and are taken from samples analyzed recently:—

	Unpolluted Stream	*Polluted Stream*
Dissolved oxygen	0.80	0.16
Suspended matter	0.25	15.00
Total solids	28.00	126.00
Free ammonia	0.005	0.315
Albuminoid ammonia	0.010	1.100

The difference in the number of micro-organisms in the two cases was very marked and affords conclusive evidence of pollution.

The total number of micro-organisms present in one cubic centimeter were:—

Unpolluted stream.... 1,790
Polluted stream 3,600,000

It may be observed that ten cubic centimeters of the polluted water contain nearly as many inhabitants as Great Britain.

The significance of the figures given may be explained briefly.

The Admiralty Standard Apparatus for Determination of Dissolved Oxygen

Dissolved Oxygen. Natural waters dissolve oxygen to an extent varying directly with the pressure and inversely with the temperature. At 0 deg. C. and 760 mm. pressure the amount dissolved is 1 part by weight per 100,000 of water or 7 c.c. per litre. Fish life is dependent upon this dissolved oxygen. When it falls to 0.16, fish can only breathe with difficulty; when no dissolved oxygen is present, they die very quickly. Waste liquors contain readily oxidized organic matter. When the untreated liquor is discharged into a stream, the dissolved oxygen in the latter oxidizes this organic matter and the water becomes deaerated. Ultimately, the water will dissolve oxygen again, but before this can happen the fish are suffocated. If the liquor does not contain oxidizable matter, and is aerated by passing it over a paddle, no diminution in the dissolved oxygen of the stream will occur. The liability of an effluent to cause deaeration may be judged by determining the amount of oxygen which it absorbs from an excess of fully-aerated water. If more than 2 parts of oxygen per 100,000 are absorbed in 5 days, the effluent is of bad quality.

The test, which is simple, is carried out in the following manner:— The effluent is shaken for half a minute to distribute the suspended matter and aerate the liquid, after which 300 c.c. of the liquid with four times their volume of well-aerated tap water at 65 deg. F. This is mixed and poured into four bottles, the capacity of which

* Dyer and Calico Printer.

is about 350 c.c. and known accurately. The bottles are filled to the mouth, allowed to stand for 5 minutes and then stoppered. Two of these bottles are placed in an incubator at 65 deg. F. and left for five days. Dissolved oxygen is determined at once in the contents of the other two bottles. At the end of five days the dissolved oxygen is determined in the contents of the first two bottles, and the oxygen which has been absorbed obtained by difference.

Determining Oxygen

The dissolved oxygen is determined in the following manner: Nitrites are oxidized, if present, by adding 0.9 c.c. of sulphuric acid and 2 c.c. of decinormal potassium permanganate solution, followed by sufficient potassium oxalate solution to decolorize the excess of permanganate. After this, 1 c.c. of a 33 per cent solution of manganous chloride is added and 5 c.c. of a solution of 70 parts of potassium hydroxide and 10 parts of potassium iodide in 100 c.c. of water. The stoppers are replaced, the bottles inverted twice and allowed to stand in a dark cupboard for 10 minutes with occasional rotation. Twenty c.c. of the liquid are then removed by means of a pipette, and the liberated iodine in the remainder titrated with decinormal sodium thiosulphate solution, using starch as an indicator. Each cubic centimeter of the thiosulphate is equivalent to 0.0008 grams of oxygen.

More Exact Determination

A more exact method for the determination of dissolved oxygen may be noted in which the Admiralty standard apparatus is used. This consists of a glass burette illustrated in Fig. 1. Before use the taps are greased with vaseline. First of all the taps T_1 and T_2 are taken out and six glass rods are dropped into the burette, after which the taps are replaced. The water to be tested is drawn into the burette until it is full by applying suction at B and the taps are closed. Two c.c. of a cold saturated aqueous solution of manganese chloride are placed in the bulb D which is graduated for this volume. The taps T_1 and T_2 are opened, so that the solution is sucked into the burette, an equal volume of liquor being discharged at A. The taps are next closed and the tube E and bulb D are cleaned out with water and 2 c.c. of a solution of 10 parts of potassium iodide and 70 parts of potassium hydroxide in 100 c.c. of water are admitted in the same way. The taps are now closed and the burette inverted several times to mix the chemicals with the water, the glass rods assisting the operation. After this 2 c.c. of sulphuric acid are admitted and the contents of the burette again mixed. A clear solution containing iodine equivalent to the dissolved oxygen is obtained. The burette is now inverted and the liquid run into a flask to the 250 c.c. mark. The iodine is titrated in the usual manner with decinormal sodium thiosulphate solution, using starch solution as indicator. The reactions involved are represented by the equations:—

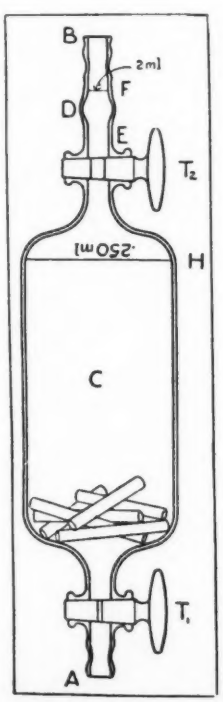


Fig. 1

(1) $MnCl_2 + 2KOH = Mn(OH)_2 + 2KCl$
(2) $2Mn(OH)_2 + O + H_2O = 2Mn(OH)_3$
(3) $2Mn(OH)_3 + 6HCl = 2MnCl_3 + 6H_2O$
(4) $2MnCl_3 + 2KI = 2MnCl_2 + 2KCl + I_2$.

Permissible Suspended Matter

Suspended Matter. This should not be higher than 2 parts per 100,00. It is determined as follows:—A Gooch crucible is prepared with an asbestos mat, dried and weighed. The liquid under examination is shaken well and 250 c.c. poured off before the suspended matter has had time to settle. This is filtered through the Gooch crucible with the aid of a pump. The crucible is then dried at 100 deg. C. and weighed. The increase in weight gives the suspended matter.

Ammonia. The first products of the decomposition of nitrogenous organic matter are (1) ammonia or ammonium salts and (2) soluble organic amino compounds which yield ammonia when boiled with an alkaline solution of potassium permanganate. The second type of ammonia is termed albuminoid ammonia. The presence of either free, saline or albuminoid ammonia in a quantity greater than 0.01 parts per 100,000 indicates pollution with nitrogenous organic matter. A measured volume of the water is distilled and 100 c.c. of the distillate collected. The ammonia is determined in the distillate by means of Nessler solution and a standard solution of ammonium chloride. A solution of potassium permanganate and sodium hydroxide (free from ammonia) is then added and a second 100 c.c. distilled off. This contains the albuminoid ammonia which is determined in the same manner as the free ammonia.

Chief Purification Principles

The chief principles underlying the purification of industrial waste liquors are:—

(1) sedimentation with or without the aid of precipitants,
(2) filtration,
(3) bacterial oxidation,
(4) aeration.

These must be varied according to the nature of the liquor to be dealt with. Before discussing the application of these principles it is desirable to enumerate the chief types of liquors which have to be dealt with and to consider whether they should be treated collectively or separately with the object of recovering their constituents.

These include (1) soap liquors, (2) chlorinating liquors, (3) bleaching liquors, (4) dye liquors, (5) mercerizing and other alkaline liquors.

Soap Liquors. Soap is the most important assistant

used in a dyeworks, and as a rule no attempt is made to recover it. There are two well-known methods of recovery. The liquor is strained to remove suspended matter and treated either with sulphuric acid or with the salt of a metal which forms an insoluble soap. In the first case the fatty acid is liberated, in the second the insoluble metallic soap. When sulphuric acid is used, the crude fatty acid is collected and subjected to hot pressing, the melted fatty acids running out. These may be used directly for the production of soap or still further purified by distillation. In the second method the soap liquor is mixed with milk of lime which results in the formation of insoluble calcium soap. This is separated, decomposed with sulphuric acid and treated as before.

Recovered Soap

The soap obtained from recovered fatty acids is not of very good quality, since a considerable proportion of unsaponifiable matter is present in the recovered grease. Nevertheless, it is suitable for some kinds of work and is used regularly by some firms. The chief reason why recovery is so seldom employed is that the volume of liquor to be treated necessitates the provision of large collecting tanks. This, however, is due to the fact that no attempt is made to separate the strong soap liquor used in scouring from the wash water. If the original soap liquor were collected separately, together with the first washings, there is no reason why the process should not be profitable.

Chlorinating Liquors. These liquors containing chlorine are of no value and can only be rendered innocuous. The best way of doing this is to treat them with ferrous sulphate which is oxidized by chlorine to the corresponding ferric salt in accordance with the equations.

$$Cl_2 + H_2O = 2HCl + O$$

$$2FeSO_4 + 6HCl + O = Fe_2Cl_6\text{-} + 2H_2SO\text{-} + H_2O$$

After oxidation has taken place the mixture is made slightly alkaline with milk of lime when ferric hydroxide is precipitated. The bath used for dechlorinating which contains sodium sulphite or sulphurous acid can only be neutralized with lime. When this is done some of the sulphurous acid is precipitated as calcium sulphite.

Treating Dye Liquors

Bleaching Baths. Hydrogen peroxide cannot be recovered, and it is not necessary to destroy it. This may, however, be done if desired by means of ferrous sulphate or waste sodium sulphite liquor.

Dye Liquors. These may contain dyestuffs, acids, salts or other assistants. Mordanting baths must be considered also. The principal dyestuffs will be acid and direct colors. If solutions of these be treated with ferrous sulphate or aluminum sulphate and the mixture made alkaline with milk of lime, in most cases the dyestuff will be adsorbed by the precipitated metallic hydroxide and carried down with it. Old bichromate liquors can be treated in the same way, or they may be mixed with dechlorinating liquors and made alkaline with milk of lime. In the first case a mixture of ferric or aluminum hydroxide and chromium hydroxide is obtained; in the second, chromium hydroxide alone. This can be collected and filtered in a press, but unfortunately it has no commercial value.

Caustic Soda Liquors. Mercerizing liquors are treated with sufficient lime to decompose any sodium carbonate or soap which may be present, and allowed to stand until the precipitate has settled. The clear liquor is then drawn off and concentrated.

Recovering Kier Lyes

Old lyes from the kier are used, sometimes, as a preliminary soap for fresh lots of cotton. They may be regenerated by boiling with sufficient lime to recausticize the sodium carbonate and decompose soaps. After allowing the precipitate to settle, the clear liquor is syphoned off, although much of the organic matter is carried down with the precipitate, some remains in solution.

In another method, proposed by Freiberger (*J. Soc. Dyers and Col.*, 1922, 25), the liquor is boiled with lime and sufficient bleaching powder to give the solution a slightly yellow color without increasing its oxidizing power. A solution of bisulphite is then added, until the chlorine is reduced, this being indicated by the discharge of the yellow color. The precipitated organic matter and calcium compounds are allowed to settle and the clear liquor drawn off.

It will be observed that the only chemicals which are worth recovering are caustic soda and soap and, excepting mercerizing liquors, both soap and caustic soda are generally wasted.

Chief Treatment Methods

When the untreated liquors cannot be discharged straight into a public sewer, the following method of treatment is suitable. It comprises:—

(1) Collection of the liquors in a suitable tank.

(2) Precipitation by means of aluminium sulphate, ferrous sulphate or aluminoferric followed by sedimentation.

(3) Passing the clear liquor from the settling tank through a coke filter.

(4) Aeration of the effluent from the coke filter.

The apparatus must be constructed in duplicate, each unit being capable of dealing with the volume of liquor produced in a day or other suitable period.

The collecting tank is lined with cement. Its floor should slope towards the end at which the liquors enter it, in order to facilitate the removal of the precipitate. Sludge cocks are required also.

The waste liquors from all the sources mentioned above are passed through a sieve into this tank and mixed with sufficient ferrous sulphate to interact with the soap, alkali, bichromate and chlorine.

Milk of lime is then added until the mixture has an alkaline reaction to litmus. A copious precipitate of ferrous and ferric hydroxide is produced, which also coagulates organic matter and adsorbs coloring matters. Aluminium sulphate acts in a similar manner, except that it has no effect on chlorine or bichromate. Ferrous sulphate is not only more effective, but has the further advantage of being cheaper. Alumino-ferric is used sometimes. This

contains both iron and aluminium sulphates and combines the advantages of both. Aluminium hydroxide has greater adsorption powers than the corresponding compound of iron. The quantity of ferrous sulphate required must be determined by experiment. When the right amount is used the precipitate settles rapidly, leaving a perfectly clear supernatant liquid.

The clear liquid from the precipitation tank is run on to a coke filter when the unremoved soluble organic matter becomes oxidized. These filters are constructed in the same way as for the treatment of domestic sewage, and the liquid is sprinkled over the surface by means of a rotating sprinkler which ensures preliminary aeration.

The depth of the filter need not exceed 4 ft. The coke should be clean and broken into pieces of about the size of a walnut. At first, it has comparatively little purifying action, but as ritrifying bacteria grow upon the coke it becomes gradually efficient. In the case of a new bed, efficiency may be accelerated by treating it with sewage and water. Filtration must be intermittent, since aeration is essential. After the filter has been filled and the cock is opened and the liquid allowed to run out slowly, thus displacing the liquid by air. Oxygen is absorbed by the coke, the coke becomes activated and able to oxidize another charge of effluent.

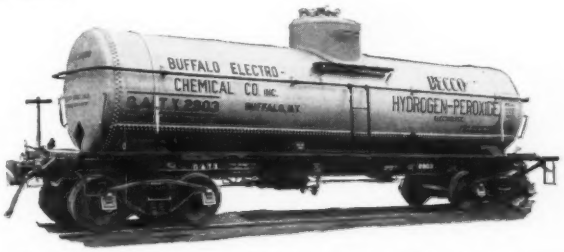
Aeration. The effluent from the coke filter may be passed over land if this be available before it enters the stream. If this can be done, not only is further purification effected but atmospheric oxygen is dissolved. If land be not available the effluent should flow down a terraced slope in a thin layer, or passed over a paddle wheel. Good aeration of the effluent before it enters the stream is of importance, because it reduces the danger of deaerating the latter and causing the death of fish. If fish can survive when placed in the effluent, it cannot be objectionable after dilution by the water of the stream. It was formerly the custom of the London County Council to test their effluents regularly by this method.

Hydrogen Peroxide Now Being Shipped in Tank Cars

Demand is the occasion and economy the result of tank car apparatus for shipping hydrogen peroxide, according to the Buffalo Electro-Chemical Company, Inc., Buffalo, N. Y. Compared with glass carboys, the tank car affords real economies that naturally reflect on the price of the commodity shipped. Glass carboys protected in the usual manner by being packed in excelsior or straw in a strong wooden carrying case weigh approximately two-thirds of the weight of the material shipped.

The new tank car, now in regular use, has a capacity of 8,000 gallons, or the equivalent of 80,000 pounds of the shipper's hydrogen peroxide. For a similar shipment of hydrogen peroxide in carboys, nearly three carloads of containers would be required! Thus it can be readily understood why the shipper was eager to find more economical ways and means of getting his product to the consumer.

Hydrogen peroxide has been used for a great many years in the arts as a bleaching agent but its use was segregated to but a few of the industries for reason that by the old or antiquated methods of producing the same, production cost was too high to enable it to compete with other bleaching agents. It was always understood, however, that hydrogen peroxide was an ideal bleaching agent and the only drawback to its use was the excessive cost of same.



Since the adoption of the electrolytic method for manufacturing hydrogen peroxide in this country the production cost of hydrogen peroxide has been not only considerably lowered but the expense in shipping was likewise effected for reason that by the electrolytic method hydrogen peroxide solutions can be gained directly from the still in concentrations of 100 volume and over. More plainly speaking, by the old method of manufacturing it was almost possible to manufacture solutions of more than 20 volume, whereas as stated above, today solutions of 100 volume or stronger can be manufactured.

Thus the shipper is shipping hydrogen peroxide instead of water and one can readily understand what a reflection this exercises on price when the present expensive transportation rates are taken into consideration.

With the above economies effected, hydrogen peroxide is rapidly gaining its place as a leading agent for use in bleaching all sorts of textiles. As a matter of illustration, it might be cited that large cotton manufacturers who found it uneconomical to use hydrogen peroxide several years ago are now making preparation to use it exclusively for reason that they can purchase hydrogen peroxide at a price that enables it to compete with any other bleaching agent that is sold.

In addition to its use as a bleaching agent used in the textile industry, it is also used for oxidation purposes of all kinds. It is further used in the bleaching of straw, fur, wool, silk, rayon, and as a matter of fact, any material on which a bleaching or oxidation result is desired.

In conclusion it must not be overlooked that the abovementioned accomplishment in shipping was brought about only by intensive, extensive and careful research, as a great many obstacles had to be overcome. Research on shipping and on improved bleaching methods, as well as economies in manufacturing its high-grade product are being constantly carried on by the Buffalo Electro-Chemical Company who operate a most modern plant in Buffalo under the Pietzsch and Adolph process. The popularity of their product is evidenced by the fact that the demand for same is steadily increasing.

Chemical Research Unimpaired By Reduced Federal Appropriations

By **WALDON FAWCETT**

The announced policy of utmost economy in Government administrative policies for 1932 and 1933 is not expected to seriously impair the continuing program of chemical research in the various departments. This is the substance of the reaction at Washington to the disquietude in industrial circles regarding the Federal experimental, investigative, and explorative work. Rumors have circulated in business circles, including the dyestuffs sector, to the effect that drastic cuts by the 72nd Congress in the regular annual expense accounts of the several departments and independent bureaus will seriously curtail the quest for scientific knowledge in all its aspects.

OFFICIAL Washington takes a reassuring tone without actually knowing how deep will be the cut in operating income. Executive officials in the several departments have steeled themselves for a reduction of at least 20 per cent. The curtailment may be even deeper. Because, in the face of a mounting Treasury deficit it is not certain that even the allotments by the Budget Bureau will be accepted as final. One school of thought in Congress holds out for a horizontal cut in the allowance of every Government office regardless of the havoc. Even so, the worst that is likely to befall is a sharp distinction between research projects in process and new ventures.

The spirit of confidence which characterizes sentiment at Washington is based primarily on the fact that the utmost in Government economies contemplates no reduction of the research personnel. In the field of private industry, one of the first consequences of the depression has been the curtailment of staffs. Particularly, it seems, in the research departments. That policy will have no parallel in the Federal establishment. Equally significant is the lack of evidence to date of any similar retrenchment on the part of the scientific bodies and trade associations that are cooperating with the Government in chemical research. For example, there is no disposition apparent to withdrawn the research Associates detailed to the National Bureau of Standards by various organizations in industry. If the chemists are kept on the job there is little doubt that they will find constructive work to do.

Likewise contributory to confidence in a policy of "No Interruption to Research" is the circumstance that during the past few years the Government has assembled a fairly comprehensive research plant. The equipment for chemical research is particularly complete. Thus, it is possible to contemplate a continuance of routine operations without extensive requisitions for new installations or supplies. Granted so much to Federal research as a going concern that is to be kept going, what Washington is prepared to hear is that there will be few new projects initiated, other than the ones which may be required by new legislation or the extension of regulatory work of one kind or another. Exceptions are to be noted also in behalf of the scientific adventures which seek to uncover new outlets in industry for agricultural products.

At the National Bureau of Standards, there will be a feeling of consolation, if the new appropriations for work on projects helpful to the dyestuffs industry can be held at the level reached in 1931, because that level was appreciably above that of a few years ago. In the case of color standardization, for example, the appropriation is $15,800 as against $10,950 in 1929. Investigation of textiles has been financed to an aggregate of $60,900 in 1931 as compared with $53,900 in 1930. It is realized however, that, on some items, appropriations will be maintained only the event that the industries concerned take occasion to impress upon the Appropriations Committees of Congress the necessity and present urgency of the appropriations. One influence that may operate to plead the cause of sustained appropriations for textile research is the growth in the responsibilities of the Bureau of Standards as a specification-writing agency for the various branches of the Government. This is, in a sense, a complement of the testing work which the Bureau has carried on, for years past, in verification of Government purchases. During the last fiscal year the Bureau prepared or assisted in the preparation of forty specifications for textiles. Textiles are steadily gaining, too, in representation in the self-identifying, quality-guaranteeing labeling system sponsored by the Standards Bureau.

The most interesting feature of the continuing research program in the textile field is the investigation of fastness to light of dyed textiles, carried on in cooperation with the American Association of Textile Chemists and Colorists. The weighted silk probe ranks as a close second, since the development of an accelerated ageing test for weighted silk, with its agreement between the effects of exposure of silk to a carbon arc light for a few hours under certain conditions of temperature and humidity and those of exposure to a north light for several months.

One line of research which may be prosecuted at the National Bureau without drawing too heavily upon the flattened Federal purse is the further development of

special textile test methods. The results to date include the evolution of new apparatus for measuring the thermal transmission of fabrics—a device that is much simpler to construct and to operate than the earlier apparatus, requires a smaller sample for test, and gives results more rapidly. Incidentally, the new apparatus is compact and portable. Illustrative of the results, practical to industry, which flow from this creative work at the Standards Bureau is the construction of an instrument by which thickness can be read directly for any pressure on the fabric from zero to a given maximum.

A hint of the manner in which Federal research is capable of exerting indirect influence upon marketing conditions in the textile field is afforded by the present and prospective program on alternative fabrics for parachutes. A challenge to silk was definitely presented when cotton cloth, woven at the Bureau, with an eye to the requirements of air service, was submitted to the Bureau of Aeronautics of the Navy Department for tests at Lakehurst. Further examples of experimental cotton parachute cloth in 75-yard lengths will be given to the same agency for service tests. Meanwhile there will be continuance of studies—with the aid of a special machine—of the factors of tension during mercerization, and time temperature and concentration of caustic, etc., involved in the mercerization of cotton for aeronautical purposes.

Upward of twenty different research projects will be included if the Color Standardization program is carried forward in its present scope. It may be possible to add to the methods already worked out for expressing tolerances in color specifications. There is no reason to suppose that the limits of possible improvement have been reached in methods of computing dominant wave length and colorimetric purity. Nor in the methods for the determination of trilinear coordinates of color by visual photometric measurements.

The standardization of Lovibond glasses which has been in progress since the early part of 1928 is still an unfinished story. A total of 1,696 red glasses have been calibrated but there remains the tasks of standardizing the glasses in other connections where there is urgent need. The rapidly increasing industrial use of spectrophotometers has served to spur a line of research work equally as important as that just mentioned. Preparations have been made to issue filters of certified spectral transmission which may be used in testing the performance of spectrophotometers. While the Bureau has, for some years past, made spectrophotometric tests of railway signal glasses, the standard glasses established by the American Railway Association have never been in its custody. That transfer is now announced.

Among the miscellaneous activities under the lump appropriation for Color Standardization there may be cited the life tests of lamps used for color-temperature determinations, measurement of diffuse reflection, color of daylight, spectral reflection of colored silk and cooperation on a new absolute standard of light. Several different phases of future cooperation in research at the Standards Bureau have potentialities of contact with the dyestuffs industries. This is the case, for example, with the project in which the Government has joined with the Associated Knit Underwear Manufacturers of America for a study of the properties of knit underwear fabrics. This project has already sought basic information on the effect of variables on such properties of fabrics as air permeability, thermal transmission, coefficient of friction, and moisture permeability, more than one hundred different constructions being employed in the tests. The dyestuffs industries may also derive some information from the conclusions on the research of the absorption of liquids by fibrous materials which is a joint undertaking of the Bureau and the National Association of Dyers and Cleaners, and from the color and fabric phases of the research on hosiery problems for which two Research Associates are maintained at the Bureau by the National Association of Hosiery and Underwear Manufacturers. The several indirect contacts above mentioned are, of course, separate and apart from the cooperative program of the Bureau and the American Association of Textile Chemists and Colorists. The latter, as our readers know, embraces such objectives as determination of the action of light on silk; determination of iso-electric point of wool and appraisal of waterproof fabrics.

In common with other lines of original research in this quarter, chemical research at the Department of Agriculture faces one possible hazard in a Congressional drive for economy. The liability consists in the fact that the Department's research policy, in its present magnificent proportions, is of comparatively recent origin. It is conceivable that Congressional pruners might argue that expenditures could be reduced to the old level with less opposition than in the case of Governmental institutions where the research traditions are longer established. On the other hand, research at the Agricultural Department is intimately identified with the cause of farm relief and the effort to solve the problem of agricultural overproduction. Chemical research, moreover, is necessary to provide the background for much of the Department's law enforcement work, notably in the food and drug field.

The Bureau of Chemistry of the Department of Agriculture was engaged, this past year, on 131 major lines of inquiry and 559 sub-projects. No fewer lines of scientific attack await the new fiscal year. Many of the undertakings in chemical and technological research have direct or indirect contact with the dyestuffs industry. As for appropriations at the hands of the present Congress, there are two deterrents to reduction. The first lies in the Bureau's concentration on utilitarian objectives.

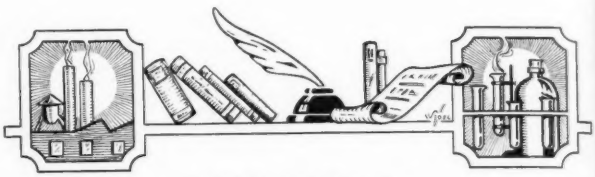
In a general way, the Chemistry Bureau encourages the development of more research in the realm of pure science. But, for its own part, it is concerned only with specific problems, each approached with the definite object of solving some practical problem. Research for research's sake without regard to practical applications has no place in this institution. The second restraint upon any impulse to curtailment is found in the fact that most

of the appropriations are what might be termed "routine." All the major lines of inquiry are continuous, or at least cover a period of years. And the sub-projects, as completed, are succeeded by others, almost invariably along the same lines of inquiry.

Illustrative of the continuity technique in research is the work of the Chemistry Bureau on dye intermediates. So long as importations of dyes continue at the present rate (1,700,000 pounds in 1930) the officials feel that there is much work yet to be done in pointing the way to new fields for the production of domestic dyes that will compete with the imports. Accordingly, it is planned to carry on the present studies, which include determinations of physical constants of dye intermediates, investigation of fundamental details of synthesis, improvement of existing methods and preparation of additional vat-dye intermediates. Every step taken in establishment of the physical constituents of new compounds is, of course, a contribution to future investigations.

Attempts to change the ratios in the field of intermediates is fraught with no greater significance, perhaps, than the exploration at the Bureau of the biological application of dyes. The ambition is to provide a dependable basis for selection for the use of stain technologists who have been uncertain as to the results to be expected from the several dyes in commercial mixtures which have strong antiseptic value or other properties and are useful in bacterial work and in the examination and differentiation of the various constituents of animal and plant life. The key to the estimate placed, at the Chemistry Bureau, upon this phase of the color problem is found in the remark of Chief Henry G. Knight:—"Stains bear somewhat the same relation to many biological researches that dyes bear to the textile industry". The practical side of the work in hand is found in the fact that so much of it is directed to the ascertainment of what methods of preparation give good yields of pure material.

Because a certain amount of research work is carried on coincident with the routine examination of food colors, the dyestuffs industry may find satisfaction in the knowledge that a revision downward of Federal appropriations in general will not imperil the continuing program of the Color Laboratory of the U. S. Food and Drug Administration. Indeed, it is just possible that, in the vent of the enactment by Congress of certain proposed amendments to the Food and Drug Act, this institution, which deals primarily with the certification of coal-tar colors, will be faced by added responsibilities. The research work in this quarter is concerned almost exclusively with the improvement of methods of analysis of food colors. In conclusion it may be noted that upon a continuance and expansion of chemical or technical research by the Government is dependent the full functioning of much of what passes for popular, practical research. As a case in point there might be mentioned the Textile-Utilization Experiments of the U. S. Bureau of Home Economics to determine the household wearing qualities of textiles.



BOOK REVIEWS

Textile Design and Colour Elementary Weaves and Figured Fabrics with Appendices on The Manufacture of Rayon and Standard Yarns Weaves and Fabrics. Third Edition. By William Watson, F.T.I., Superintendent and Lecturer in Textile Manufacture, the Royal College, Glasgow. 476 pages—438 Figures including 1800 different diagrams. Price $7.50, Longmans Green and Company, 55 Fifth Avenue, New York City. The author has endeavored to give in a single volume all that is essential in regard to cloths that are composed of one series of warp and one series of weft threads, the more advanced consideration of the subject dealing with compound and special classes of cloths being left to a second volume entitled "Advanced Textile Design".

The structure of standard classes of cloths, the theories of color, and the application of colors to textile fabrics are described and thoroughly illustrated. Eight chapters are devoted to the designing of ordinary figured fabrics. Textile calculations and the principles and limitations of weaving machinery as far as they concern woven design are adequately considered.

The Appendix on Standard Yarns weaves and fabrics includes 75 pages with a glossary of 700 or more terms. Appendix II on the manufacture of rayon includes 35 pages which altho condensed and void of an amount of detail, gives an excellent and well illustrated discussion of the manufacture of the four common types of rayon and some of their properties

This book contains a large amount of material for its size (6 x 9½ inches). The type is small but very clear and is easily read. The illustrations are of an excellent order. Few books will be found containing so much valuable material in regard to textile design in so small a space.

Manufacture of Artificial Silk. E. Wheeler, M. B.E. F.I.C. 2nd edition, 177 pages and 73 illustrations. Van Nostrand Company.

The first edition of this book was published in 1927 and in the present edition the author has incorporated new material to cover the developments of the past three years. The discussion of the Viscose process occupies nearly a third of the entire book, and not only gives adequate descriptions of the machines used, but also goes into considerable detail in regard to the various operations involved. The treatment of the process of manufacturing Acetate rayon occupies but ten pages; Cellulose Nitrate six; and Cuprammonium eight.

The remainder of the book is devoted to the properties and uses of artificial silks, a description of miscellaneous fibers of a similar character to artificial silk such as, staple fiber, hollow filaments, artificial horsehair and artificial straw. A chapter is also devoted to the economics of artificial silk production and also an appendix discussing the laboratory method for controlling the manufacture of Viscose, physical tests of the fiber and its identification.

An Index of Patented Mothproofing Materials, R. C. Roark, Insecticide Division, Bureau of Chemistry and Soils, U. S. Dept. of Agriculture. Pages 125, duplicated typescript, paper backed. Washington, D. C. Government Printing Office, May 1931.

The number of patents which have been taken out on mothproofing materials is quite remarkable, but when we consider that in the United States alone it is estimated that clothes moths, carpet beetles, and similar insects destroy $100,000,000 worth of material each year it is not surprising.

The purpose of this Index is to aid those engaged in researches on insecticides by making known materials which have been proposed or tested for insect control. It is believed that in many cases a material which has been found to be an effective insecticide for use against clothes moths may find application against insect pests attacking vegetation.

The title of the book is rather misleading because it is not only an index of patented materials but also includes a discussion of many materials which have been used or experimented with for this purpose, but which are not patented and the long list of references will serve as a bibliography upon the subject. No claim is made as to the completeness of this bibliography other than that it is a list of articles and patents that have been consulted in compiling the index.

New Patents

Abstracted by Synthetic Organic Chemical Mfrs. Assn.

Sulphur Dyestuffs. (Consists in refluxing the leuco indophenol from octo-hydro-acridine and para-aminophenol with sodium sulphide, sulphur and copper sulphate in the presence of alcohol. Cotton dyed violet to green shades fast to light and boiling.) Friedrich Muth, of Elberfeld, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,832,233, November 17, 1931.

Sulphur Dyestuffs. (A continuation in part of above patent No. 1,832,233.) Friedrich Muth, of Elberfeld, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,832,234, November 17, 1931.

Production of Vat Dyestuffs of the N-Methyl Acridine Anthrone Naphthoquinone Series. (Consists in treating N-methyl - Bz - 1'- benzanthronyl-1-aminoanthraquinone with caustic alkali, giving violet dyeings on cotton and on oxidation in the air, turning to blue-green.) Paul Nawiasky, of Ludwigshafen-on-the-Rhine, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,832,236, November 17, 1931

Production of Polyazo Coloring Matters. (And more particularly trisazo coloring matters of the benzidine series dyeing unmordanted cotton greenish to bluish black shades.) Walter M. Ralph, of Hamburg, N. Y., assignor to National Aniline & Chemical Co., Inc., of N. Y., N. Y., No. 1,832,322, November 17, 1931.

Black and Grey Vat Dyes. (Comprises, for example, condensing hydroxylamine with the products obtained by the alkaline fusion of a sulphonated methyl benzanthrone.) Sidney Thornley, of Blackley, Manchester, England, assignor to British Dyestuffs Corp., Ltd., of Manchester, Eng., No. 1,832,594, November 17, 1931.

Dyestuffs Containing Metals and Process of Making Same. (Consists in treating the azo-dyestuffs obtained by alkaline coupling diazotized 5-nitro-2-amino-1-phenols and 1-amino-8-hydroxynaphthalene - monosulfonic acids with agents yieldings metals capable of forming complex compounds with the azo-dyestuffs; dye ordinary or weighted silk from a neutral or fatty soap bath reddish-grey, red-blue to green-blue and green tints.) Fritz Straub and Hans Mayer, of Basel, Switzerland, assignors to firm of Society of Chemical Industry in Basle, of Basel, Switzerland, No. 1,833,237, November 24, 1931.

New Azo Dye. (Comprises coupling a diazotized aminophenyl-benzothiazole mono-sulfonic acid with a mono-sulfonic acid of an acetoacetanilide; cotton dyed yellow to orange shades of good fastness to light and water, also suitable for use as pigment dyestuffs.) Richard Stusser, of Cologne-Deutz, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,833,269, November 24, 1931.

New Triarylmethane Dyestuff. (Comprises condensing a hydroxy-diaryl-methane compound with an aromatic hydroxy compound in an alkaline solution in the presence of an oxidizing agent, dyeing wool reddish blue to reddish purple shades.) Berthold Wenk and Hermann Stotter, of Leverkusen, near Cologne-on-the-Rhine, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,833,271, November 24, 1931.

New Intermediates and Process of Making Same. (Comprises dissolving 1.1'-dinaphthyl - 8.8' - dicarboxylic acid with anhydrous zinc chloride and glacial acetic acid and isolating the benzo-benzanthrone-carboxylic acid thus formed. A division of application Serial No. 121,283, filed July 8, 1926.) Georg Kalischer, of Frankfort-on-the-Main, and Werner Zerweck, of Fechenheim, near Frankfort-on-the-Main, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,833,290, November 24, 1931.

New Water-insoluble Azo Dyestuffs. (Prepared in substance or on the fiber by combining the arylides of the 2:3-hydroxynaphthoic acid with the diazo compounds of asymmetric meta xylidines; dye cotton clear shades, similar to alizarine red, fast to light and kier boiling.) Eugen Glietenberg, of Leverkusen-on-the-Rhine, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,833,567, Nov. 24, 1931.

Water-insoluble Azo Dyestuffs. (See above patent No. 1,833,567.) Eugen Glietenberg, of Leverkusen/Rhine, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,833,568, November 24, 1931.

Vat Dyestuffs of the Acridone Series. (Obtained by reacting trichlor-anthraquinone acridone with 2.5-di--chloraniline, sodium acetate and copper chloride; cotton dyed bluish-green to green shades of good fastness, especially to light.) Robert Berliner, of Leverkusen-on-the-Rhine, Ger., assignor to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,833,770, November 24, 1931.

Dyestuffs. (Consists in the preparation of a blue vat dyestuff, by heating 1-amino-2-chlor-anthraquinone in naphthalene or nitrobenzene in the presence of sodium carbonate and a catalyst containing copper.) William Graham Woodcock, Hugh Albert Edward Drescher, Ernest George Beckett, and John Thomas, of Grangemouth, Scotland, assignors to Scottish Dyes, Ltd., of Grangemouth, Scotland, No. 1,833,808, November 24, 1931.

New Basic Azodyestuffs and Process of Making Same. (Dye mordanted vegetable fiber yellowish to reddish to brown to violet shades of good fastness; process carried out substantially by means of two operations in any sequence, namely, by the formatio nof the azobody and by the introduction of the quarternary group.) Georg Kalischer, of Frankfort-on-the-Main, and Richard Gast, of Frankfort-on-the-Main, Mainkur, Ger., assignors to General Aniline Wks., Inc., of N. Y., N. Y., No. 1,833,839, November 24, 1931.

New Sample Card

The General Dyestuff Corporation announces the following new sample card: I.G. Dyestuffs on Loose Cotton I.G. No. 553, which illustrates mixtures of Indanthren Dyestuffs, especially for dyeing loose cotton.

Guinea Brown RLS

The General Dyestuff Corporation offer a new straight acid brown brought out by the I.G., Guinea Brown RLS. Dyed from a Blauber's salt sulphuric acid bath it is said to produce a full reddish-brown. Guinea Brown RLS is especially recommended by the manufacturer for the dyeing of ladies, dress goods.

Tanoyl

Dr. K. T. Steik, chief chemist of the Nopco Laboratories, division of the National Oil Products Company, Harrison, N. J., announces the development of a new moellon for the tanning industry. This product, to be known as Tanoyl 1621, is said to possess unusual fat-liquoring qualities and freedom from separation on storage. Tanoyl 1621 has, according to the manufacturers, demonstrated its practical value in a series of exhaustive tests and applications. An explanatory data sheet entitled Tanoyl 1621 is being placed in the hands of tanners.

Department of Textile Research

Skinner & Sherman, Inc., chemists and engineers, of 246 Stuart Street, Boston, Mass., have recently established a department of textile research and testing, under the direction of M. W. Weiss. This department will consolidate the various services which Skinner & Sherman, Inc., have rendered the textile industry for a number of years.

New Card

In a new card "Shades Fast to Light and Sea Water on Worsted Yarn" given out by the General Dyestuff Corporation, a selection of Acid and Palatine Fast Colors are shown straight and in combination shades which on account of the very good fastness to water and salt water, washing and perspiration claimed for them are said to be especially adapted for the dyeing of knitting yarn for bathing suits, sweaters, etc.

For the Schedule of Issues for 1932
See Page IX

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED

RAYON AND COTTON DYER—Skein dyer, all types of dyes. Ten years' thorough experience. Technical college graduate. Perfect matches. Reasonable salary. Address Box No. 708, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED

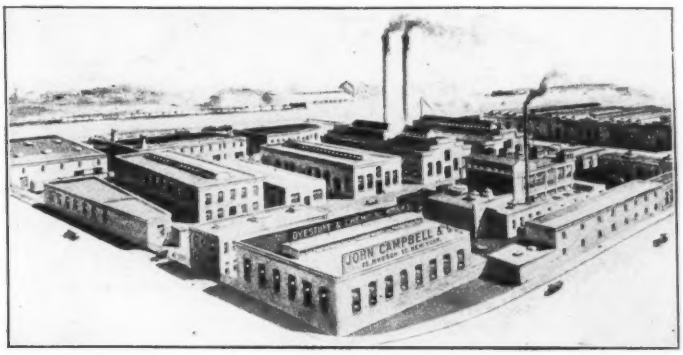
Salesman of chemicals, oils and dyestuffs, formerly connected with large manufacturer, is open for sales position. Have established trade and can give very satisfactory references. Apply Box No. 709, American Dyestuff Reporter, 440 Fourth Avenue, New York. N. Y.

POSITION WANTED

Textile Chemist and Colorist with ten years' practical experience, being available, solicits inquiries. Address Box No. 710, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

"STANDARDS EVERYWHERE"

CAMEL DYES



WORKS: NEWARK, N. J.

New Chromate Brown E B Conc.

(*Mordant Acid Dye*)

A new type of this superior color which can be dyed by the Meta-chrome, Chrome-bottom and Top-chrome methods, producing a deep nigger brown shade.

This color possesses excellent solubility, fastness to fulling, potting, washing, level dyeing and penetration; very good to ironing, alkali, acid, carbonizing and light; and recommended for dyeing raw stock, slubbing and piece goods. It is also a very good color for machine dyeing.

Without a doubt, the fastest and best Chrome Brown for any woolen mill to use.

Acid Anthracene Red 3B

(*Color Index No.* 487)

This gives a blue shade and is an exceptionally good color for dyeing piece goods. It can be used for shading Chrome colors, either Top-chrome or Chrome-bottom. It also has neutral dyeing properties and can be used as a shading agent for coloring of animal fibres. Vegetable fibres are left practically white. It is recommended to be dyed with Glauber salt and Acetic acid, which exhausts the bath and brightens the shade. This color has excellent exhausting properties, very good penetration, solubility and level dyeing. Can be used for unions in a neutral bath; silk and wool are dyed, cotton is slightly stained when heavy shades are desired. Excellent to steaming, water, washing, carbonizing, potting and acids. Very good to fulling and perspiration. Moderately good to light.

Acid Anthracene Red G

(*Color Index No.* 443)

An excellent acid color, very fast to milling and recommended for raw stock, knitted materials and piece goods. Dyed with Glauber salt and Acetic acid, which brightens the shade and gives better exhausting properties; also suitable for dyeing and printing pure silk and tin-weighted silk. It discharges very good on tin-weighted silk. This color is excellent to rubbing, potting, steaming, sea water, very good to fulling, hot pressing, water, acid and alkali; moderately fast to light and stoving.

WE SOLICIT
Your Inquiries
for Samples
and
Quotations

JOHN CAMPBELL & CO.

(ESTABLISHED 1876)

American Dyestuff Manufacturers

75 HUDSON STREET NEW YORK, N. Y.

Branches and Warehouses:

BOSTON PHILADELPHIA CHICAGO PROVIDENCE
SEATTLE TORONTO

METROPOLITAN WAREHOUSE COMPANY

COMMERCIAL STORAGE — DISTRIBUTION

Available, space 75,000 square feet with low insurance rate—complete sprinkler system and competent watchman service.

Private railroad siding and track connections at the CARLTON HILL station of the Erie R. R.

MAIL ADDRESS
CARLTON HILL, N. J.
P. O. Box 152

Affiliated with....
NEW YORK and CLIFTON TRANSPORTATION CO.

DISTRIBUTION... twice daily to all points in Greater New York and Northern New Jersey.

●

NEW YORK CITY
PASSAIC—LODI
BROOKLYN
BAYONNE
NEWARK
GARFIELD
ELIZABETH
PATERSON
JERSEY CITY

●

TELEPHONES:
Rutherford 2- {7500, 7501, 7502}
Passaic 2-7070

●

NEW YORK OFFICES:
9-11 Varick Street
Phones Walker 5- {9560, 9561, 9562}

After all . . what really matters?

aside from Product Adaptability . . economical Accomplishment!

"ROYCE" Textile Chemicals are produced in accordance with strictly modern and substantial practice. "Tradition" steps aside . . and "Service" . . suitability and resultful assurance bids attention!

For Supreme Finishing "Effects" ▶ ▶ ▶

- ▶ CASTOR OIL
- ▶ OLIVE OIL

] Sulphonated — High in SO_3 value Acid resistant

- ▶ TALLOW — Sulphonated as 25/50%

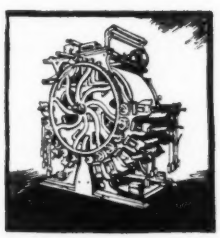
ROYCE CHEMICAL COMPANY

• MANUFACTURING CHEMISTS •

CARLTON HILL · NEW JERSEY

NEW ENGLAND REPRESENTATIVES: Richard Haworth, Inc., 25 Fountain Street, Providence, R. I.

FORMOPON*



A satisfactory discharge paste necessitates the use of uniform, smooth-running Sulfoxylate. For quality, uniformity and money-value, vat and discharge printers prefer FORMOPON.

RÖHM & HAAS CO., INC.

222 West Washington Square

Philadelphia, Pa.

*Reg. U.S. Pat. Off.

STRENGTH *unimpaired*

DIASTAFOR does more than strip starch from the warps of cotton, mixed goods and rayon. It insures a better dyeing and bleaching job. And it de-sizes without impairing the strength of the fabrics.

No wonder leading mills always use DIASTAFOR. Let our technical man explain how easy and economical it is; or write to—

FLEISCHMANN'S DIASTAFOR

DIASTAFOR DEPARTMENT
STANDARD BRANDS, INCORPORATED
595 MADISON AVE., NEW YORK CITY

AKTIVIN-S

REG. U.S. PAT. OFF.

Here's every essential for perfect sizing . . . .

AKTIVIN-S, the remarkable product which produces soluble starch when added to your starch mixtures, ensures the following:

Thorough penetration—increased adhesive strength—even covering—smoother, rounder yarn—less dusting—speedier loom performance.

No accurate control of time or temperature is required. Mixtures are colorless and viscous. The size is sterilized, does not sour and is easily removed before kierboiling or dyeing. Mouldiness is prevented. Solution does not decompose over night; re-heating brings back fluidity.

Write for booklet giving complete story of AKTIVIN-S. A generous test sample sent without obligation.

THE AKTIVIN CORPORATION
50 Union Square New York City

THE AKTIVIN CORPORATION — AKTIVIN — NEW YORK

Exclusive Southern Sales Agents
AMERICAN ANILINE PRODUCTS, INC.
45 East 17th Street N. Y. City

"Hit or Miss" PROCESSING IS FAR TOO COSTLY . . .

Attempting to produce quality processing with inferior oils or agents is mere folly in today's market.

You *must* use oils that guarantee perfect uniformity and quality.

HART PRODUCTS, backed by many years of specialized experience, do just that. Our expert research laboratory staff is at your call for information or aid as to your particular needs.

hart PRODUCTS BASED ON RESEARCH

Don't hesitate to make use of this service. It's gratis.

The Hart Products Corp.

Textile-Processing Specialists

1440 BROADWAY NEW YORK CITY

- Kier Oils
- Softeners
- Rayon Oils
- Anti-Mildew Agents
- Cotton Warp Dressing
- Finishing Oils
- Rayon Sizings
- Wetting-out Agents
- Bleaching Oils
- Dye Assistants
- Sulphonated Oils
- Silk Soaking Oils
- Degumming Oils
- Backwinding Oils

Fade-O-Meter

BRINGS NEW STANDARDS TO COLOR DETERMINATIONS

Exact knowledge of color permanence was impossible before the advent of the Fade-Ometer. Similarly specifying a definite degree of color fastness was impossible because no unit of measure existed. Colors might be guaranteed fast but the term was vague and manifestly the degree of fastness shown in actual use of the color was effected by local conditions. Fade-Ometer meets this situation by measuring color fading by the Violet Carbon Arc a light source that approximates sunlight and never varies. Results may be stated "This color guaranteed fast under so many hours Fade-Ometer exposure." This system protects maker—seller—buyer—user. You are sure to find Fade-Ometer will pay for itself in your service in a short time. Investigate.

Then, too, comes the question of laundry fading of color in fabrics. Launder-Ometer answers that question as fully and accurately as Fade-Ometer answers the one of sun fading. Launder-Ometer is the Standard Machine for Laboratory Washing Tests. Operated according to the standard procedure, sent with the machine, for each type of test, it gives unvarying, speedy results. We will be glad to tell you fully about both of these machines if you will send for Bulletin ADR-21.

ATLAS ELECTRIC DEVICES CO., INC.
361 W. SUPERIOR ST., CHICAGO, ILL.

Absolutely Pure—nothing else will do!

This assurance of dependability is responsible for the industry's widespread acceptance of

Quaker OILVENTINE PASTE

Here is a product which guarantees perfect scouring of textile fabrics, full penetration of the chemic and uniformity of shade, thereby eliminating costly re-dyes.

Also adaptable for Kier Boil Assistant on cotton fabrics.

QUAKER CITY CHEMICAL COMPANY
Division of
O. F. ZURN CO.
PHILADELPHIA, PENNA.
KNOXVILLE, TENN. HAMILTON, ONT., CAN.

ALIZARINE LIGHT VIOLET 2RC

Only brilliant fast-to-light Violet which stanas chroming and levels well. Its light-fastness is 8 (maximum).

SANDOZ CHEMICAL WORKS, INC.
NEW YORK, N. Y.

PATERSON BOSTON PROVIDENCE
PHILADELPHIA CHARLOTTE SAN FRANCISCO

SANDOZ

Carbic Color & Chemical Company, Inc.

INDIGOSOLS

Trade-Mark Registered U. S. Pat. Off.

Aniline Colors Dyestuffs Chemicals

451-453 WASHINGTON STREET NEW YORK CITY

Branch Offices: Philadelphia, Providence, Boston, Greensboro, N. C., Hamilton, Ont.
SOLE AGENTS FOR DURAND & HUGUENIN S.A., BASLE, SWITZERLAND

Established 1895

BOSSON & LANE

Manufacturers of

The Original

BLEACHING OIL

for boiling out Cotton, to produce a foundation for a Pure White

High Grade Sulphonated and Saponified

CASTOR OIL PRODUCTS

Para Soap Oil

Solvents and Assistants for cleaning all Textiles

B & L Bleachers' Bluings and Tints

Works and Office, ATLANTIC, MASS.

Send for a sample of STABOLEUM

a new Kali product that has won high favor everywhere.

Staboleum is a sulphonated castor oil developed after considerable research.

Staboleum is especially adaptable wherever strong acids are used, such as in silk and wool dyeing, bleaching, carbonizing, printing, etc. It gives no precipitate with lime, magnesium or other metallic salt solutions, even up to the saturation point. It does not form "dough balls" with hard water.

Staboleum Is Manufactured Only by

The KALI Mfg. Co.
Manufacturing Chemists
1410 N. Front Street, Phila., Pa.

CERTAINLY!

JOHN H. MORAN & CO.
INCORPORATED

CHEMICALS - OILS - DYESTUFFS

28 SOUTH FRONT STREET ♦ PHILADELPHIA, PA

CALL LOM. 4375-7677
MAIN 6714

WHEN YOU NEED IT • WE HAVE IT

Value
When You Go To
PHILADELPHIA at
HOTEL
PENNSYLVANIA

A Room and a Bath
For Two and a Half

WE HAVE
THEM

$2.50 Single with Bath
$4.00 Double with Bath

39th & CHESTNUT Sts PHILADELPHIA

"BROSCO"
SILK FINISHES

•

Brosco Dull Finish
Finishing Compound S. P.
Brosco Scroop Oil

•

BY COMBINING THESE FINISHES in various proportions, it is possible to obtain any desired degree of low lustre, water and spot proofing, softness or scroop finish—*in one bath.*

Manufactured by

IN U. S. A. SINCE 1907
SCHOLLER BROS., INC.
Amber and Westmoreland Sts.
Philadelphia, Pa.

IN CANADA SINCE 1927
SCHOLLER BROS., LTD.
St. Catharines, Ontario

The HOTEL
PICCADILLY
225 West 45th St. · NEW YORK

There's an air of
hospitality that you'll like!

Adjacent to every activity...600 bright, sunlit rooms . . .

Accommodations for TWO in a double bedded room at the usual single rate. . . . . .

$3.00 to $5.00 daily

F. D. SOFIELD
Managing Director

DURING 1932

• THE AMERICAN DYESTUFF REPORTER WILL APPEAR ON THE FOLLOWING DATES •

EVERY OTHER MONDAY

JANUARY . . 4-18
FEBRUARY . 1-15-29
MARCH . . . 14-28
APRIL 11-25
MAY 9-23
JUNE 6-20
JULY 4-18
AUGUST . . . 1-15-29
SEPTEMBER 12-26
OCTOBER . . 10-24
NOVEMBER . 7-21
DECEMBER . 5-19

Proceedings of the AATC&C

HERE'S THE END OF SILK SPECK TROUBLES

A new achievement . . . a line of bright acid colors especially adaptable for the dyeing of silk specks and wool . . . in the same operation from an acid bath.

Now, manufacturers of dress goods and cloakings, users of carbonized shoddy can produce dress goods shades of excellent resistance to light . . . in perfectly even combinations.

Write today for details about this line of Dysil colors (Fast Yellow 3 G.S.—Orange G.S.—Scarlet G.S.—Red B.S.—Blue 6 G.S.—Navy Blue 2 B.S. —Black C.B.S.). We'll be glad to send you our D-1 assortment of dyeings and product samples.

UNITED ANILINE Co.

Manufacturers and Importers

Dyestuffs . . Chemicals . . Sulphonated Oils . . Penetrating Oils Textile Soaps

156 Pearl Street, Boston, Mass.

Selling Agents—PEERLESS COLOR CO., Plainfield, New Jersey

ONYX

For Quick, Inexpensive Prints . . .

ONYX PRINTING GUM-S

No Need for Washing Out!

ONYX PRINTING GUM-S produces excellent prints in either Screen or Machine printing, giving thorough penetration, fine lines and clear colors.

A distinct advantage and cost-cutter of ONYX PRINTING GUM-S on less expensive prints is the fact that it need not be washed out. If left on the goods, it has no harsh effect, odor or objectionable quality.

Write for test sample, without obligation.

ONYX OIL & CHEMICAL CO.

Specialists on Finishing Materials

Jersey City, N. J.

Our laboratories are at your service

Streaky Viscose

can be dyed

in *Level Shades*

by using

RIGAN

BLUES and GREENS

in combination with

many of the

CHLORANTINES

Dyes for Master Dyers

Sole Representatives in the United States for the

SOCIETY OF CHEMICAL INDUSTRY IN BASLE

Basle, Switzerland

Sole Selling Agents for

DOW'S INDIGO — MIDLAND VAT BLUES

ciba Co. Inc.

GREENWICH and MORTON STREETS

NEW YORK

BRANCHES

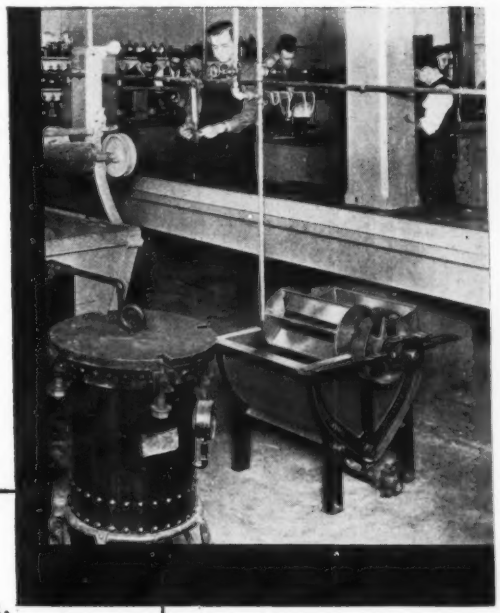
GREENVILLE, S.C. · BOSTON · CHICAGO · GREENSBORO, N.C.

PHILADELPHIA · PROVIDENCE · SAN FRANCISCO

Ciba Co. Ltd., Montreal, Canada

PROVED!

Monel Metal "entirely satisfactory" for textile laboratory equipment



View at dyehouse at Clemson College, showing all Monel Metal paddle dyeing machine.

CHAS. E. MULLIN, B.Sc., M.Sc., F.A.I.C., F.T.I.
CONSULTING CHEMIST
PROFESSOR OF CHEMISTRY, RAYON AND DYEING
HEAD DIVISION TEXTILE CHEMISTRY
CLEMSON COLLEGE, SOUTH CAROLINA

January 6, 1931.

International Nickel Company,
67 Wall Street,
New York City, N. Y.

Dear Sirs:

In reply to your recent letter, I will say that we have considerable Monel Metal apparatus in use in our textile chemistry and dyeing laboratory. Among other things, we have several dye tubs lined with Monel Metal and heated with Monel Metal coils, both the open and closed type. We have some constant temperature water baths, for use in dyeing experiments, which have Monel Metal tops; a Monel Metal, paddle type hosiery dyeing machine, and a number of small vessels, such as pans, buckets, etc., for use in dyeing smaller lots.

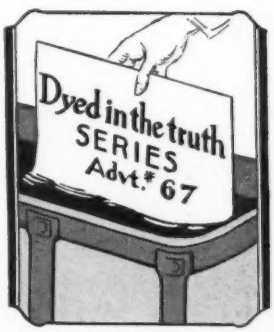
All of this material has been in use for some time and a part of it for some years. We have found it entirely satisfactory for every purpose for which it is intended. In fact it has given me considerable pleasure to recommend Monel apparatus to a number of concerns who are dyeing their own rayon and similar yarns in the old fashioned wooden apparatus. I have repeatedly told these people that they are paying for good apparatus, even though they do not have it, in the amount of yarn which they are spoiling by the present methods of handling. I am sure that this is true.

In spite of the fact that we have students handling this apparatus at all times, and that these students have not previously handled Monel Metal, we have not in any case had any difficulty in any way whatsoever with it. It is indeed a pleasure for me to give you the benefit of my experience along these lines.

Very truly yours,

Chas. E. Mullin

Students at work in dyehouse of Clemson College, South Carolina. Note the Monel Metal lined skein vats, Monel Metal dye sticks, Monel Metal pans, pails, and dippers and Monel Metal water bath for sample dyeing.



INCO MONEL METAL

Monel Metal is a registered trade mark applied to a technically controlled nickel-copper alloy of high nickel content. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL METAL

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

Index to Advertisers Appearing in This Issue

Aktivin Corporation	VI
American Aniline Products, Inc.	
American Dyewood Co.	
Arkansas Company	
Arnold Hoffman & Co.	
Atlas Electric Devices Co.	VII
Bick & Co., Inc.	
Bosson & Lane	VIII
Buffalo Electro-Chemical Co.	Second Cover
Butterworth, H. W. & Sons Co.	
Calco Chemical Co.	Back Cover
Campbell & Co., John	III
Carbic Color & Chemical Co.	VIII
Carbide & Carbon Chemical Corp.	
Ciba Company, Inc.	X
Cowles Detergent Co.	
Du Pont de Nemours Co., E. I.	XII
Dyer & Calico Printer	
Geigy Company, Inc.	
General Dyestuff Corp.	Third Cover
Givaudan-Delawanna	XI
Hart Products Corp.	VI
Hercules Powder Co.	
Herrick & Voigt	
International Nickel Co.	XIII
Kali Manufacturing Co.	VIII
Klipstein	
Laurel Soap Mfg. Co.	
Lewis, John D.	
Mathieson Alkali Works	
Metropolitan Warehouse	IV
Moran, John H. & Co.	VIII
National Aniline & Chemical Co.	
National Oil Products Co.	
Newport Chemical Works, Inc.	Front Cover
New York Color & Chemical Co.	IV
Noil Chemical & Color Works, Inc.	XIV
Nyanza Color & Chemical Co.	
Onyx Oil & Chemical Co.	X
Pennsylvania Hotel	IX
Perkins & Sons, B. F.	
Permutit Co.	
Piccadilly Hotel	IX
Quaker City Chemical Co.	VII
Rohm & Haas Co.	V
Royce Chemical Co.	V
Sandoz Chemical Works, Inc.	VII
Scholler Bros., Inc.	IX
Sonneborn & Sons, L.	
Standard Brands	VI
Stein, Hall & Co., Inc.	
Surpass Chemical Co.	
United Aniline	X
Virginia Smelting Co.	
Wolf & Co., Jacques	

Quality

The basic standard upon which the reputation of Noil products is built.

•

DYESTUFFS

for

COTTON

WOOL

RAYON

PURE SILK

and

WEIGHTED SILK

•

Stocks carried by reliable distributors in all textile centers.

NOIL
CHEMICAL AND COLOR WORKS
·INCORPORATED·
140-156 WEST 108TH ST·NEW YORK CITY

the modern and efficient washing agent

Superior in its washing action to the best soaps.

Not affected by lime in water of any degree of hardness.

Prevents the precipitation of lime soaps of ordinary soaps.

Redissolves precipitated lime soaps.

Cleans wool without felting.

Possesses good cleansing action in an acid bath.

Woolens washed with Igepon A can be dyed without trouble.

Removes dirt, fats, mineral oil, soap residues and free fatty acids.

Improves the fastness to rubbing of wool and cotton dyeings.

Its use makes possible a saving of time in the washing process.

GDC

GENERAL DYESTUFF CORPORATION

230 FIFTH AVENUE, NEW YORK, N. Y.

CALCOSOL
COLORS
Calco vat dyes prepared especially
for use in dyeing cotton and rayon
Calcosol Black BB Double Paste
Calcosol Golden Orange G*
Calcosol Golden Orange RRT*
Calcosol Flaming Orange 2R
In addition to our present line of
vat colors we are adding two new types
Calcosol Red 2G Paste
Calcosol Red 3G Paste
*Also suitable for printing
THE CALCO CHEMICAL
COMPANY, INC.
A Unit of American Cyanamid Company
BOUND BROOK, N. J.
Boston
Philadelphia
New York
Charlotte
Calco
CYANAMID
PRODUCTS